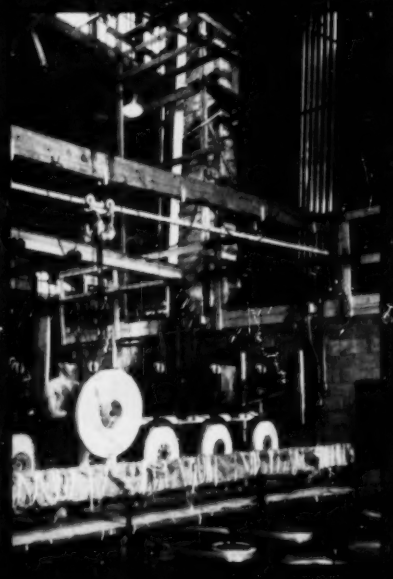
OVERSEAS EDITION
JULY 1954

DIGEST

INTERNATIONAL BUSINESS AND INDUSTRY



ATOMIC ENERGY may meet power needs throughout the world. But so far it is not competitive with low-cost conventional power-generation methods . . p 11

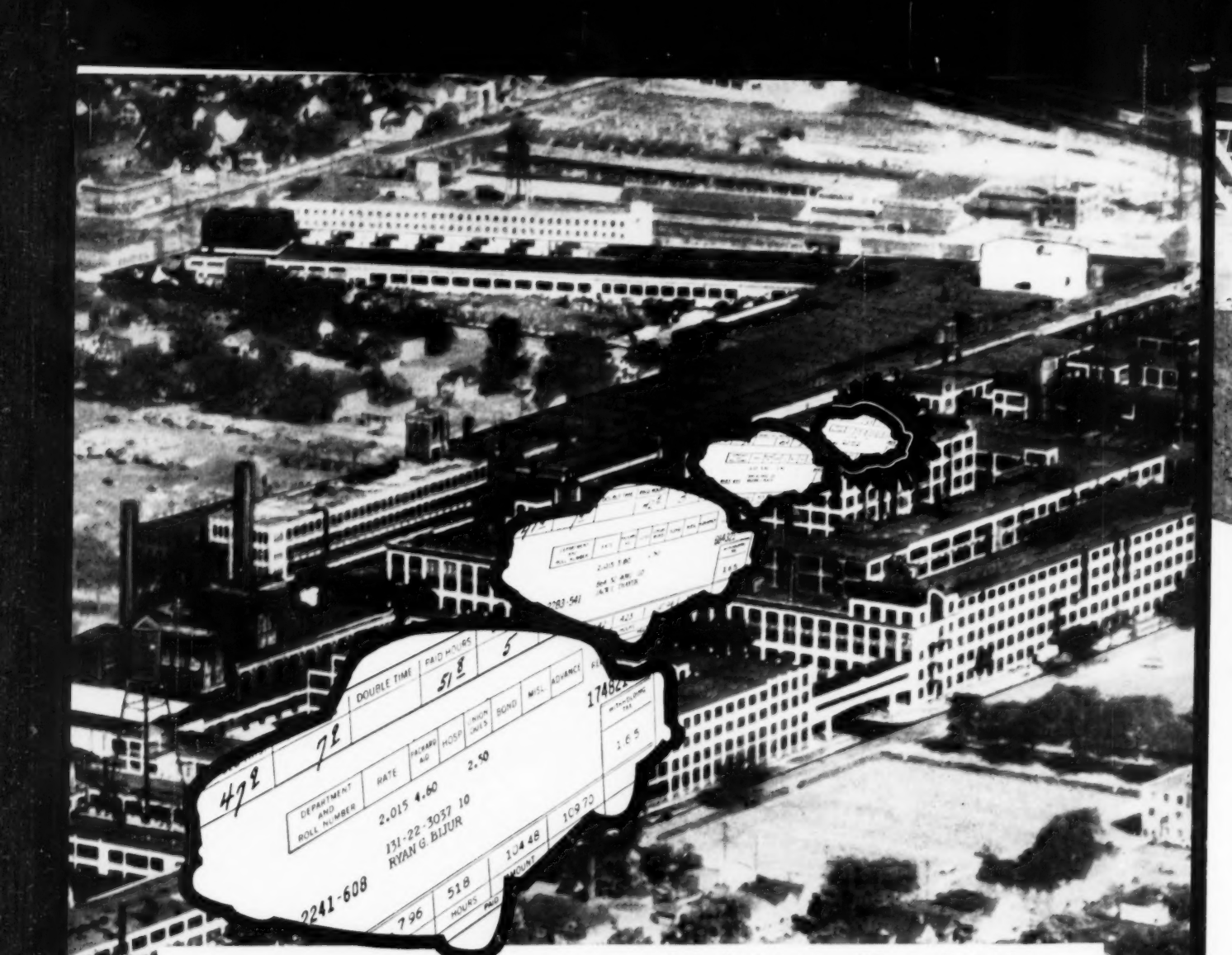
ELECTRONICS INDUSTRY is growing fast and its future promises still more rapid growth and development . . . p 13

SARAN FILM solves many packaging problems. But its unique properties call for special handling . . . . . p 20

PLANT FLOORS take plenty of abuse. The right floor for the job can cut your maintenance troubles and improve your production . . . . . p 24

FOUNDRY COSTS can be cut. A logical and effective approach is through better casting design . . . . . p 30

ELECTRICITY does a number of jobs in the modern plant. Some new applications can lead to faster production of better products at lower costs . . . . p 43



Packard's solution to payroll figure work may help *you.*

Packard mass-produces *a payroll*

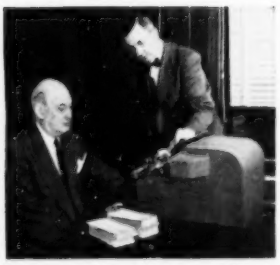
Packard Motor Car Company's new program called for more efficiency, greater expansion.

Thousands of new employees presented the payroll department with a vast, complicated figure work job. Accounting methods geared to the 1930's were breaking down. The payroll manager called in the Burroughs man.

Result? Working together, they planned a streamlined payroll operation as efficient as Packard's production lines. Heart of the system is the employee's clock card. It moves from station to station in the time and payroll departments for fast, accurate machine figuring of hourly, overtime and premium rates, taxes and other information. The clock card then becomes a convenient and complete ledger of record.

Management says this system and their Burroughs Adding and Multiplying machines, "provide a mechanical solution to nearly every one of our payroll problems with maximum speed, accuracy and economy."

Can your business profit from faster facts? Your *local* Burroughs man offers expert advice on modern business machine methods, expert service. Burroughs Corporation, Detroit 32, Michigan, U.S.A.



"Your machines pay for themselves." L. E. Peters, Packard's payroll manager tells R. C. Kittredge (standing), the Burroughs man. *Another case where Burroughs means better business!*

Call your Burroughs man

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The Allis-Chalmers Tractor with Shovel is a multi-purpose machine available at a low investment cost.

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Designed specifically for the toughest kind of work, Tractor Shovels have long life, provide easy operation and simplified servicing and maintenance . . . advantages that add up to a greater dependability on large and small projects.

HD-20G

175 hp (net)
63,325 lb
4 cu yd bucket

HD-15G

109 hp
47,580 lb
3 cu yd bucket

HD-9G

72 hp
29,900 lb
2 cu yd bucket

HD-5G

40 hp
16,200 lb
1 cu yd bucket

Increased capacity buckets available for light materials.

TL-10 Tracto-Loader

56 brake hp
11,400 lb
¾ cu yd bucket

Rubber-Tired Versatility

Where rubber-tired tractors are suitable, the TL-10 Tracto-Loader speeds up all kinds of material handling . . . provides outstanding performance on a wide variety of jobs. Hydraulic torque converter drive matches power to speed automatically . . . keeps the TL-10 producing in large volume on tasks indoors and out.

ALLIS-CHALMERS

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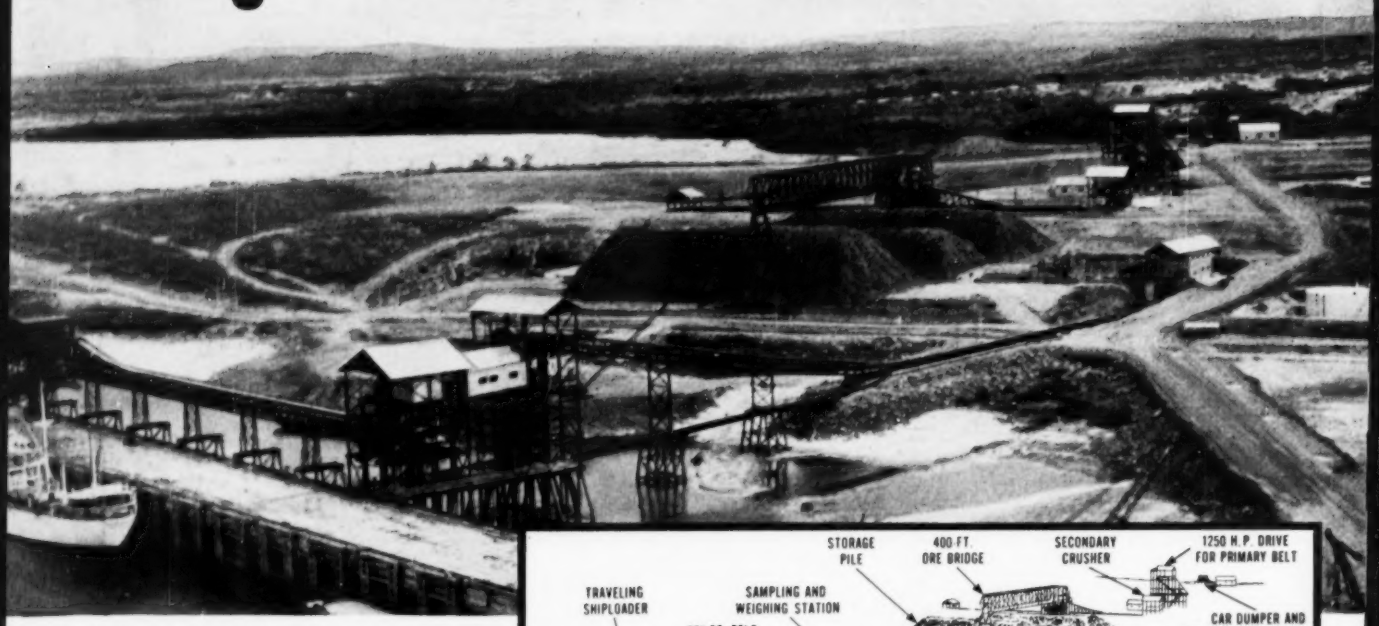
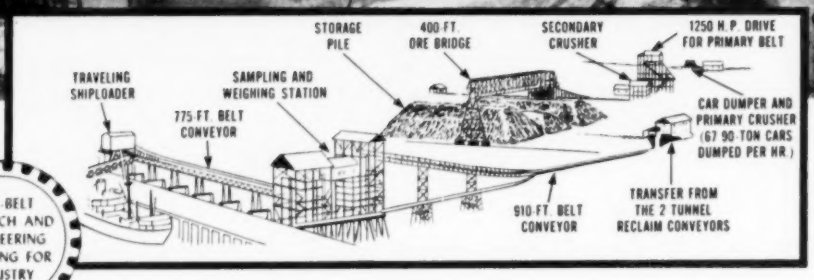
BUILDERS OF MACHINERY SINCE 1847

Moving Venezuelan iron ore to the sea

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775 FT. BELT CONVEYOR
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910 FT. BELT CONVEYOR
TRANSFER FROM THE 2 TUNNEL RECLAIM CONVEYORS

Aerial photograph and schematic flow sheet trace ore's movement from railhead to ship. Below: Link-Belt belt conveyors along dock and boom load a ship. The facility may be expanded, when necessary, to load ships at 12,000 long tons per hour.

LINK-BELT RESEARCH AND ENGINEERING WORKING FOR INDUSTRY

Link-Belt fulfills a single-contract responsibility for design, fabrication and erection of giant ore handling system at Puerto Ordaz

TO MOVE Cerro Bolivar's ore from mine car terminal to ocean-going ships, U. S. Steel's Orinoco Mining Co. appointed Link-Belt the prime contractor. The project was engineered, fabricated and installed in 23 months—approximately five months ahead of schedule. This was accomplished with the excellent cooperation of suppliers and of our subcontractors, Wellman Engineering Co., and McDowell S. A. of Caracas.

As the ore moves via Link-Belt belt conveyors to the ships, it is crushed in two stages. En route it is also stock-piled, to be reclaimed as needed at a rate of up to 6000 long tons per hour. The shiploader is versatile enough to handle all types of ocean-going ships plus a 39-ft. annual water level variation of the Orinoco river. One shiploader operator electrically controls the speed and capacity of the entire reclaiming system—from storage pile to the ship.

Although the Puerto Ordaz project is extremely large, it typifies the service offered by Link-Belt. Under a single contract, Link-Belt offers unified responsibility for complete materials handling and processing plants — from design to successful operation. A call to your Link-Belt representative will place the facilities of this comprehensive organization at your service, or write us direct.

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One source . . . one responsibility for materials handling and power transmission machinery

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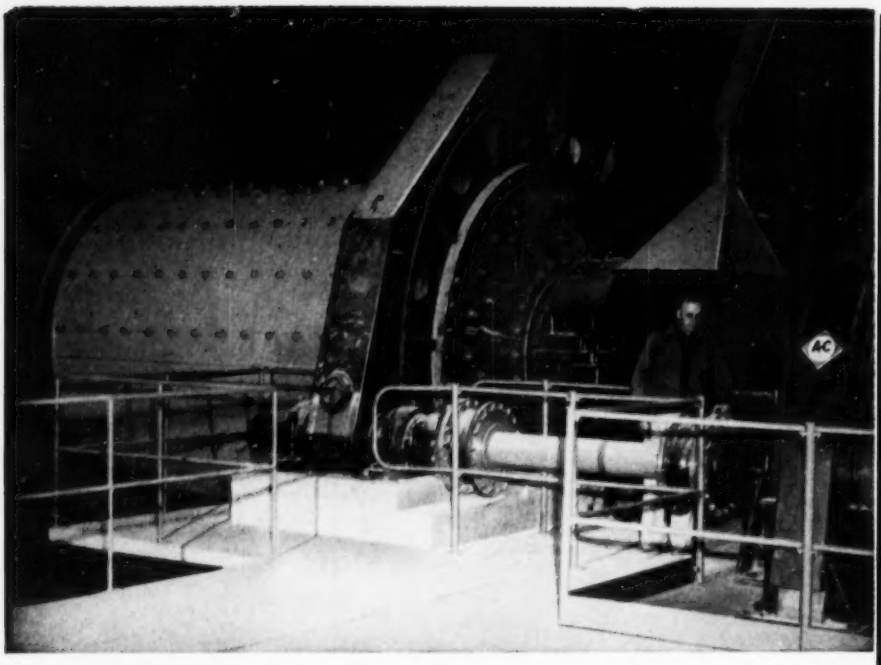

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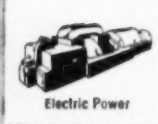
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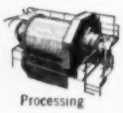
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Centrifugal Pumps

Motors and Drives

ALLIS-CHALMERS

BUSINESS TRENDS

U. S. BUSINESS OUTLOOK continues to improve. The recession begun 9 months ago has touched bottom, at least temporarily. Industrial output, down 9½% from 1953, is stabilizing for the first time since last July. Over-all employment is better. Steel output, which slid to 68%, recovered to above 70% of capacity. While the outlook is uncertain, the consensus looks for an autumn upturn.

Favorable pointers: (1) Construction is booming, with gains over 1953 widening. (2) Inventory liquidation has been substantially completed in many lines. (3) Tax cuts have put $4-billion more spending money in public's hands, $3-billion more in company coffers. (4) Continuing Far East tensions may cause an upward revision of the U. S. defense program.

Cautionary pointers: (1) Factory employment still sags (contrasting with more construction and farm jobs). (2) Improved production trend reflected in part unexpectedly high automobile output (see below); this may decline sharply as seasonal buying tapers off.

Business activity, in any case, is still humming at high levels (factory and mine output, for example, is 23% above 1947–49 levels). As one Midwest businessman put it: "If I'd never seen 1953, I'd think this was a boom."

BATTLE OF CENTURY between General Motors and Ford for automobile leadership is revolutionizing the industry and will have world-wide repercussions. The two giants have boosted their share of the car market to 77% (GM, 45%; Ford, 32%), against only 60% in 1946. Their top sellers, Chevrolet and Ford, are selling about even.

Intense Big Two rivalry is threatening to squeeze smaller producers out of the market; Chrysler output has dropped by one-third to only 13% of total. Independent makers are counting on restyled 1955 models at lower prices to help get them back into the market. There's also talk of anti-trust action against GM and Ford.

Sharp industry-wide competition—for the first time since the war—highlights the new situation. Price cutting may follow. Despite the recession, car output (mostly GM and Ford) has been running only 8% under 1953. As a result, the market is overstocked; practically every car except Cadillac has been offered by dealers at a discount.

Overseas businessmen can therefore look for keener competition of U. S. cars in world markets. Significantly, U. S. car exports jumped 11% in the first part of 1954. Chief target area of U. S. car exporters: Latin America.

U. S. TRAVEL ABROAD, despite recession, is hitting new records. Tourists will probably spend $1.3-billion this year, up 6% and easily meeting spring forecasts (McG-H Digest, March, p7).

Visitors to Europe alone will approach 500,000, against 425,000 last year. Here are gains expected by various countries: Britain, 5% (even without special events like last-year's coronation); Italy, 10%; France, possibly 20%. Air bookings to Latin America are up 10%.

Behind the boom: (1) Continued high U. S. personal income. (2) Sharply boosted tourist-class services (one U. S. airline is running two tourist flights for every first-class trip, reversing the 1953 ratio). But foreign concessions, such as British cut-rate rail travel, also help.

SYNTHETIC FOODS, fibers, chemicals are increasingly invading markets of natural products.

In the U. S.: Margarine consumption per person has almost tripled since before World War II, whereas butter use has halved . . . Man-made fibers now control more than one-fifth of fiber consumption . . . Silk has been almost completely replaced by Orlon, Nylon, and Dacron . . . But cotton and wool use has kept pace with population growth.

In Britain: Synthetic products now fill one-third of British soap and detergent consumption, against less than one-quarter in 1952. Britain is now the biggest synthetic detergent user except the U. S.

FREE PORTS in the U. S. will be doubled under the stimulus of business demands and building of the St. Lawrence seaway. Besides five existing zones (New York, New Orleans, Los Angeles, San Francisco, and Seattle), three more will soon open at Baltimore, Norfolk and Mobile; on the Great Lakes, Detroit and Toledo will join the parade.

Overseas goods can now be manufactured, finished, packaged, and displayed—also stored indefinitely—in these customs- and quota-free foreign trade zones. The ports thus become invaluable "shop windows" for overseas exporters.

U. S. free-port system is described in a timely booklet that has just been issued by the Organization for European Economic Cooperation, 2 Rue André Pascal, Paris 16; or write the Executive Secretary, Foreign Trade Zones Branch, Dept. of Commerce, Washington, D. C.

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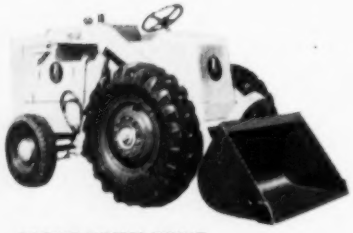

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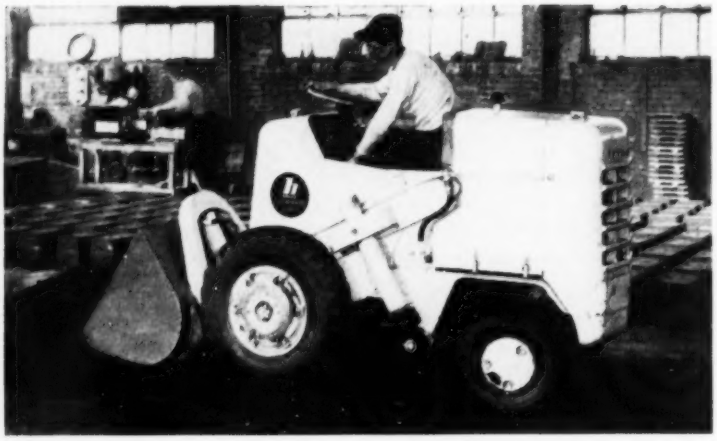

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INTERNATIONAL TRENDS

WASHINGTON—U. S. tariffs will stay about where they are for at least 18 months. Major European moves toward convertibility will be postponed another year. Those are the chief probable effects of President Eisenhower's decision to settle for a 1-year extension of the Reciprocal Trade Act and thus avoid a crisis with Congress this session on his "Trade, Not Aid" program.

But some progress toward freer trade and payments will be made. The administration will liberalize Buy-American procedures without asking Congress, will place more government orders abroad, and will give tax incentives to Americans investing abroad.

Funds will be made available through the International Monetary Fund and the U. S. Federal Reserve Bank to back currencies that are made partially convertible. But there will probably be few takers. European governments almost certainly will wait to see how Eisenhower's freer-trade program fares in Congress next year before taking any dramatic steps toward convertibility.

U. S. stalling on trade liberalization is less dangerous to free-world economic unity now that the recession seems to be tapering off (see page 7), without having done major damage abroad. There's no danger of a rush back to bilateralism and import curbs as long as U. S. imports hold up.

Neither will the system of tariff agreements negotiated since the war fall apart. Tariff concessions made within the framework of the General Agreement on Tariffs and Trade (GATT) are firm until June 1955.

The long-term outlook for U. S. foreign economic policy depends on next autumn's elections. Should the Democrats win control of Congress, they will try to push through a radical trade liberalization. Should the Republicans win, the outcome would be in doubt. In either event, action will not come until late next spring.

LONDON—Britain's astonishing economic recovery is heading for new gains. Buoyant exports (up 10%) and gold-dollar reserves, which may now reach $3.5-billion by autumn, are significant signs. They permitted the recent "bank rate" cut (to 3%), reflecting utmost confidence in British finances and further boosting business.

Behind the boom lies the recent transition of British industry from postwar repairs and replacement toward full-scale modernization. Labor shortage, by forcing adoption of labor-saving machinery and dynamic management methods, has hastened this trend. So has the need to meet strong German competition (see below). The Conservative government has solidly backed industry with production-minded tax concessions. These will almost certainly be extended in the 1955–56 budget. British goods thus become increasingly competitive.

Fruits of the "new look" in British economics are seen in reopened commodity, gold and financial markets, the end of rationing, and improved prospects for eventual sterling convertibility. At the same time, Britain's recovery foreshadows the early restoration of London to its prewar position as the non-dollar world's main clearing house.

BONN—West Germany's export drive, highlighted in Latin America by the Mexico City trade fair (McG-H Digest, June, p13), is forging ahead.

- **Chile:** The country's first sugar refinery, built with German aid, has just started operations; Germans will help build several more . . . Germans will also help put up a cellulose plant . . . Chile agreed to sell back to Germans major prewar chemical holdings worth at least $516,000.

- **Canada:** West Germany is offering to replace Britain as biggest buyer of Canadian wheat and flour if Canada buys more German automobiles, machinery, and consumer goods (new Winnipeg consulate is helping the drive).

- **Israel:** Government will buy $10-million of German equipment for modernizing railways (U. S. and French products will also participate).

- **Argentina:** Germany and Britain will get most of $15-million government orders for roadbuilding and heavy construction machinery.

- **Greece:** Germans have offered Greeks $21.5-million credits for various electrical projects.

WORLDWIDE—Rio de Janeiro: Brazil's monthly repayments of its $300-million loan from the U. S. Export-Import bank have been cut from $13- to $4.2-million; this step will boost U. S. exports to Brazil . . . Capetown: South Africa's new SASOL oil-from-coal plant will save $20-million in foreign exchange yearly when it reaches full output, probably by 1956 . . . Melbourne: An Australian Royal Commission has urged immediate introduction of television; Sydney and Melbourne will each get one government and two private stations . . . Cairo; French experts studying Cairo transport for the Egyptian government have urged a subway railway; first 3-mile stage would cost $15-million.

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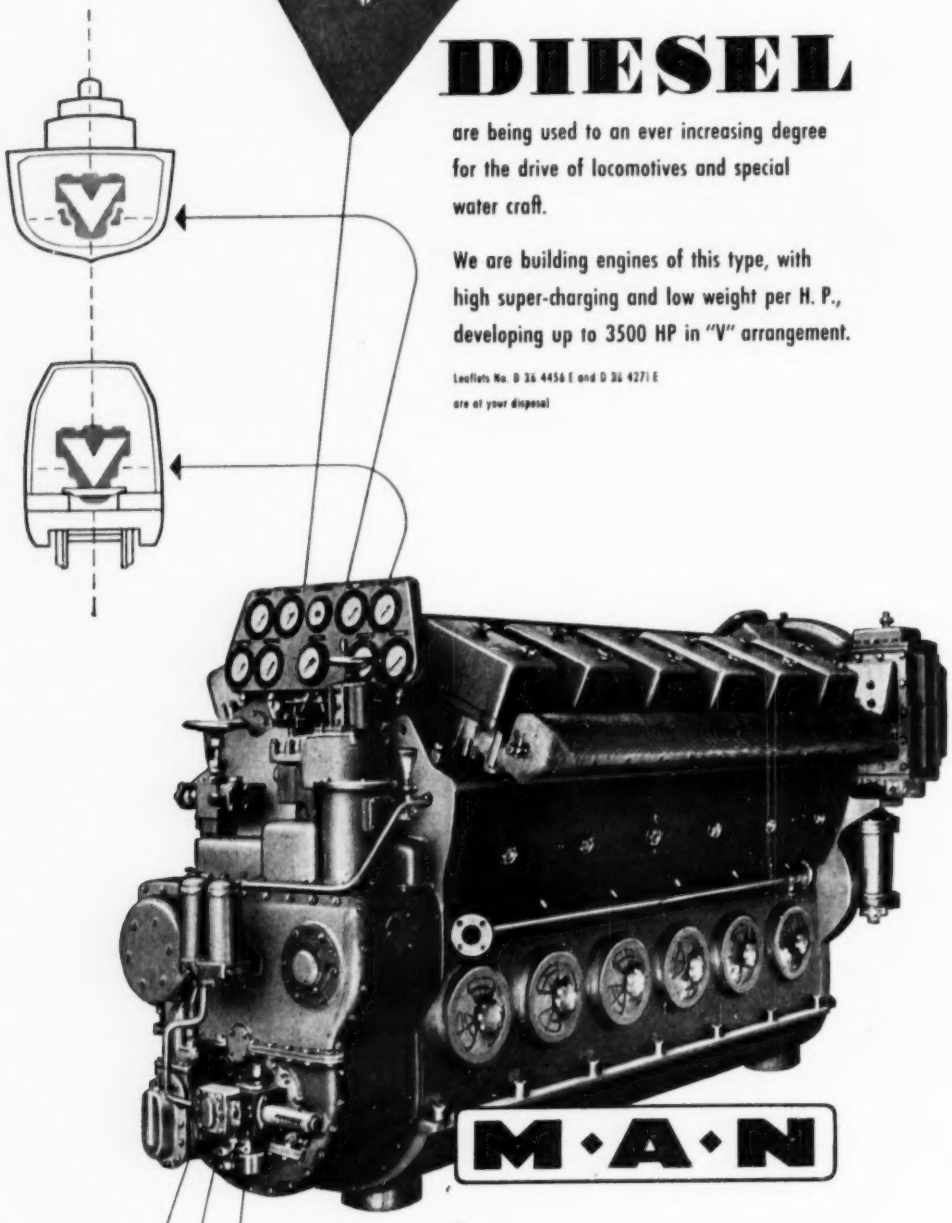

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JULY 1954
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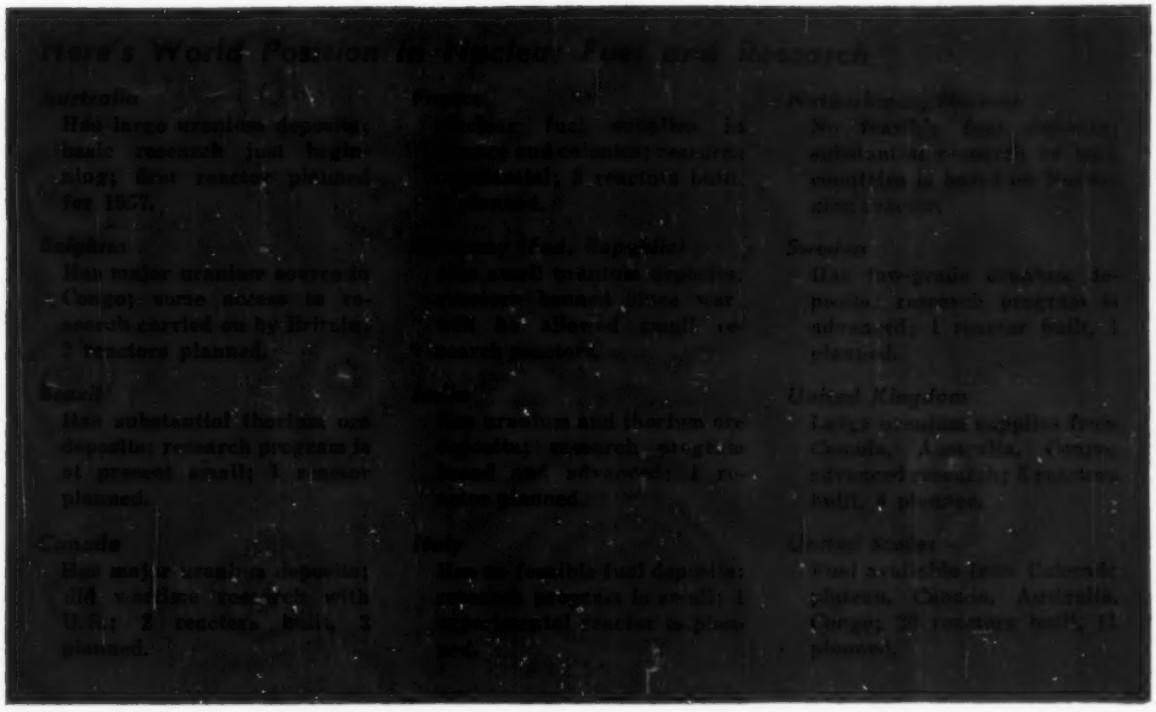

Here's World Position in Nuclear Fuel and Research
Australia
Has large uranium deposits; basic research just beginning; first reactor planned for 1957.
Belgium
Has major uranium source in Congo; some access to research carried on by Britain; 3 reactors planned.
Brazil
Has substantial thorium ore deposits; research program is at present small; 1 reactor planned.
Canada
Has major uranium deposits; did wartime research with U.K.; 2 reactors built, 3 planned.
France
Has uranium and thorium ore deposits; research program is small; 1 reactor planned.
Italy
Has no feasible fuel deposits; research program is small; 1 experimental reactor is planned.
Netherlands, Norway
No feasible fuel deposits; substantial research of host countries is based on Norwegian heavy water.
Sweden
Has low-grade uranium deposits; research program is advanced; 1 reactor built, 1 planned.
United Kingdom
Large uranium supplies from Canada, Australia, Congo; advanced research; 4 reactors built, 4 planned.
United States
Fuel available from Colorado Plateau, Canada, Australia, Congo; 20 reactors built, 11 planned.

Atomic Power: A Preview

Nuclear plants will help high-cost power countries like Britain and Japan but cannot compete with cheap hydro output.—An original Digest article

LIKE A GIANT long asleep but finally awakened, atomic power is today slowly bestirring itself. Ten or 15 years hence, it will begin assuming an important role in industry. It will be a revolutionary but not all-conquering role. The new giant will meet strong and effective competition from older and long-proven power sources—hydro, coal, and oil.

These are the facts of life facing atomic engineers today. But that nuclear power has a big future in many parts of the world is certain. In fact, it is a major goal of research in many countries (chart, above). Britain, the U.S., and Canada are striding toward the goal.

Costs, methods, and prospects of atomic power hitherto have been largely shrouded in secrecy or guesswork. To some extent, they still are. But now a study just sponsored by the U.S. Atomic Energy Commission (AEC) has thrown a revealing light on the subject. It was prepared as a guide to Congress in its work on legislation to permit sharing some of America's know-how with friendly nations.

In seeking to gage atomic-power potentials, AEC scientists base their estimates on a 20-year outlook. They assume that nuclear power plants will be available early in 1960–75 in a reasonably flexible array of sizes.

Investment costs will run around $75 per kilowatt above costs of conventional steam or internal-combustion plants. These nuclear plants will be capable of producing power at costs ranging from 7 to 8 mills (0.7-0.8¢) per kw.-hr. if operated 80% of the time.

With these probabilities to go on, AEC scientists reach the following conclusions:

• **Nuclear power plants** will be competitive with conventional plants using high-cost coal or oil.

• **They will not be competitive**—at least in foreseeable stages—with existing hydroelectric generation or with future hydro-power developed at favorable sites.

• **Highly industrialized** coun-

"The only cost advantage (of) atomic plants . . . is in the fuel."

tries with dwindling low-cost energy sources are the most likely spots for nuclear development. Britain and Japan are good examples.

• **In less developed areas,** nuclear power will probably be more expensive than conventionally-made power, except in special cases where neither hydro-power nor low-cost fuel is available.

The only cost advantage that atomic plants offer over conventional power plants is in the fuel. The mechanism required to house the atomic firebox will be relatively expensive. Turbines, generators, switch-yards, and transmission systems will cost about the same. Since fuel accounts for only about one-third of conventional generating costs, even atomic fuel savings will be limited.

Where Atomic Power Fits

How does this atomic-power outlook fit into the world-wide power picture? Here are some of the answers—based on the AEC study:

United States—Sizeable hydro-electric resources and plentiful coal and oil make America one of the best-equipped nations for power generation. Of existing conventional plants, five out of six are today beating the 7- to 8-mill per kw.-hr. production costs foreseen for nuclear power.

For these reasons, industry has been in no hurry to plunge into atomic generation. Hence all existing U. S. atomic reactors are of the research, experimental or production type. But a start has been made.

American's first atomic power station will be a 60,000-kw. plant to be operated by the Duquesne Light Co. near Pittsburgh, Pa. Now being designed by the Westinghouse Electric Corp., it will be of the pressurized water type (in which pressurized water is superheated by the atomic reactor and then used to convert other water to steam). It is expected to go into operation about 1957. The AEC, which is helping finance the plant, has asked Congress to approve plans for five more nuclear power plants.

Duquesne's atomic utility is not expected to solve the competitive cost problem in its earlier stages. But many American experts think the problem can eventually be beaten. For instance, Dr. Alvin M. Weinberg, director of the Oak Ridge National Laboratory, said recently there were excellent chances that nuclear power reactors would "ultimately" turn out to be simpler and cheaper than conventional plants.

Britain—Nuclear plants may eventually be the salvation of Britain's power problems. Reserves of coal, main source of British power, are dwindling; mining costs are steadily rising. Current conventional generating costs of about 8.2 mills per kw.-hr. may rise to 11 mills in 20 years.

Thus pressed for a new means of power production, Britain has shot into the lead in the atomic race. The first British atomic generator—an $8-million government-owned plant now being built at Calder Hall, Cumberland,—is expected to start production in 1956, a year ahead of the U. S. Duquesne plant. Another project now under way in Scotland calls for a $45-million full-scale "breeder reactor" (which "breeds" more atomic fuel than it consumes). Together the two plants will produce more than 100,000 kw.

The British estimate that if half their new capacity additions beginning in the mid-1960's are nuclear-powered, the nation's fuel bill will be cut $136-million yearly by 1975. Sir Christopher Hinton, atomic production chief, recently said: "It would not be surprising if nuclear power became fully competitive (in Britain) within another 10 years." The British also look upon atomic power plants as a promising export.

Japan—Most of Japan's hydro-power sites have already been tapped. They provide about four-fifths of her power. The rest is generated by low-grade high-cost coal—at about 20 mills per kw-hr. It is clear, therefore, that nuclear power could step in economically to replace coal-generated electricity. Among the obstacles are Japan's backwardness in atomic know-how (basic research is only just beginning) and lack of feasible atomic-fuel resources, as now known.

Brazil—The bulk of Brazil's power needs in the next 20 years, in the view of AEC's scientists, can be more cheaply met by hydro-power than by nuclear plants. The country's hydro resources are the largest in South America. But as in many other less developed regions, lack of active utility investment has retarded their utilization.

There may be room for some nuclear power development in remote interior regions far removed from conventional fuels. But even there, domestic oil might serve the purpose better, since plants would seldom run at full capacity; hence, relatively high nuclear costs would be further boosted.

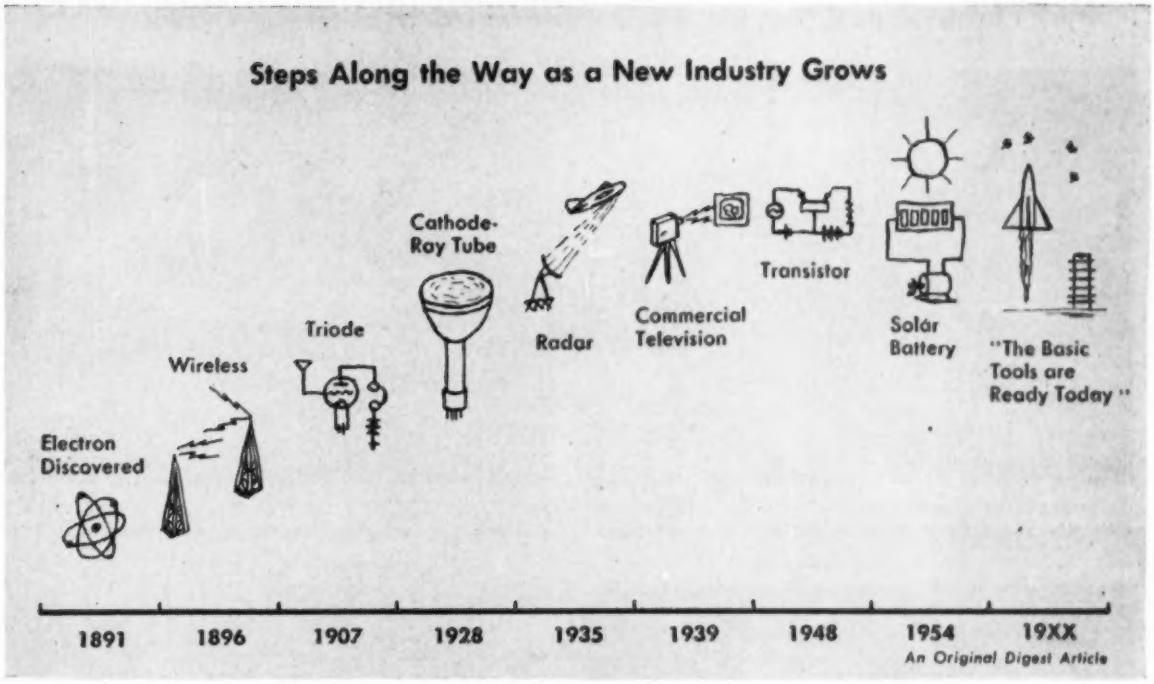
Africa—Northern and Southern Rhodesia are typical of less developed areas with huge nuclear-fuel deposits but little prospect of utilizing them for power. As in Brazil, the reason is that the territories have ample and economical conventional resources.

Atomic-Power's Future

Summing up, nuclear power in the coming generation has a bright future in industrialized countries with high-cost conventional power systems. It will have a tough time competing with low-cost conventional systems in either industrialized or underdeveloped areas.

Nuclear plants cannot be expected, in any case, to exert a major stimulus on economic growth. The reason is that power costs are only a small part of the operating expenses of most industries.

However, as the AEC study points out, development of nuclear power projects will not necessarily depend entirely on economics. Some countries where they might be of doubtful value may promote them anyhow for prestige purposes.



In Electronics, Opportunity Calls

SOME INDUSTRIES get their start from a single, brilliant invention. Others don't. In electronics, no one invention brought the industry into being (see chart above). Great names like Edison, Marconi, Fleming, De Forest, Armstrong, were behind early contributions.

But, despite vague beginnings, there can be no doubt that electronics has grown tremendously in the past 30 years. And there also can be no doubt that the future holds still greater promise for growth in electronics.

Until World War II, electronics was still an infant. But like all wars, World War II pushed technological development at a frantic pace. So important to modern warfare was electronics that Winston Churchill credits it with a large share of winning the Battle of Britain. In those years the electronics era began.

In the U. S. it has reached the $5-billion a year stage—up from just a few million in 1930. The rest of the world has also felt the impact of electronics. Practically every country in Latin America and Europe has either built or is planning a television system. In Great Britain alone, 80% of the population has access to television. But electronics is more than just radio and television.

Already electronics possesses the basic know-how to revolutionize industry. For industry, electronics can be what the brain and the nervous system are to the human body.

Four major areas begin to shape up in the outlook for electronics. All of them are destined to be vital to industry. They are (1) instrumentation and control, (2) computation, (3) mobile two-way radio, and (4) microwave relay. Here's where they fit into industry and what they will mean:

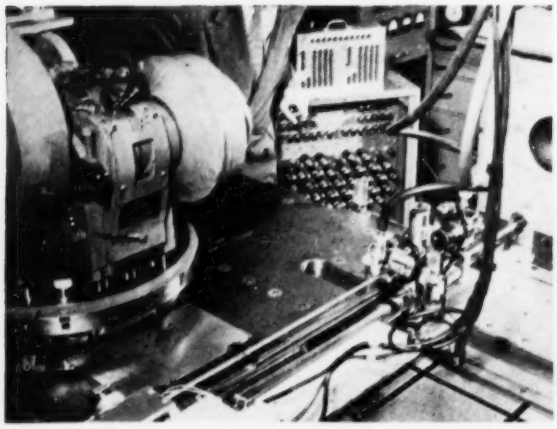
• **Instrumentation and Control**—Many electronic devices have seen little use outside the laboratory. But as processing and manufacturing get more complex, they will take on instrumentation and control functions.

Automation will provide perhaps the greatest single outlet for these devices. The trend is already in that direction. Today many conventional machines are controlled by electronics. But true automation means that a production line must be completely automatic from the reception and inspection of raw materials to the packaging and inspection of the finished product.

Only electronic devices with their ability to measure and control time, color, density, purity, height, pressure, length, viscosity can make this possible. Wherever the human senses cannot go, electronics can and will.

• **Computation**—Electronic computers, or "brains," are no longer only instruments for pure scientific research. Many companies, large and small, depend on computers to figure their payrolls, in-

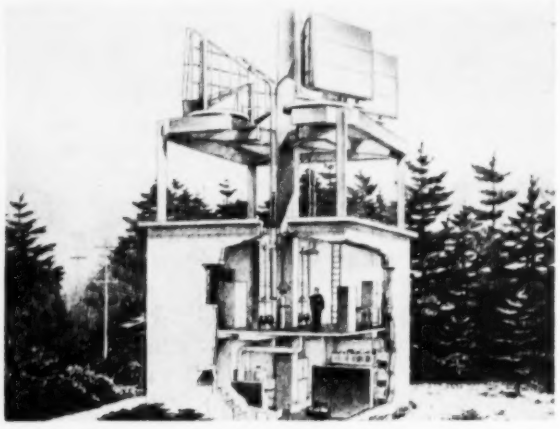
These Areas Provide Opportunities in a Growing Industry



AUTOMATION needs electronic equipment. Electronics tells this punch press when and where to punch holes.

ELECTRONIC COMPUTERS, sometimes called "brains," will help solve complex problems of business and industry.

TWO-WAY RADIO will speed far-flung operations. Here a construction foreman supervises a highway job.



MICROWAVE RELAYS make country-wide networks for telephones and television a certainty for the future.

ventories, pricing systems, forecasts.

That their potential is not yet fully realized is easily demonstrated. In the 1952 U.S. presidential election, an electronic computer was set up to predict election results. With only early returns available, Remington Rand's UNIVAC figured Gen. Eisenhower to win by a vast majority.

Informed observers disagreed and the machine was given further instructions to correct itself. But when final returns were available, vindication came to the machine. It had been right all along.

In Detroit, a cooperative project of education and industry has just been completed. More than 20 industrial and business organizations have banded together to make the services of an electronic computer available to industry and education.

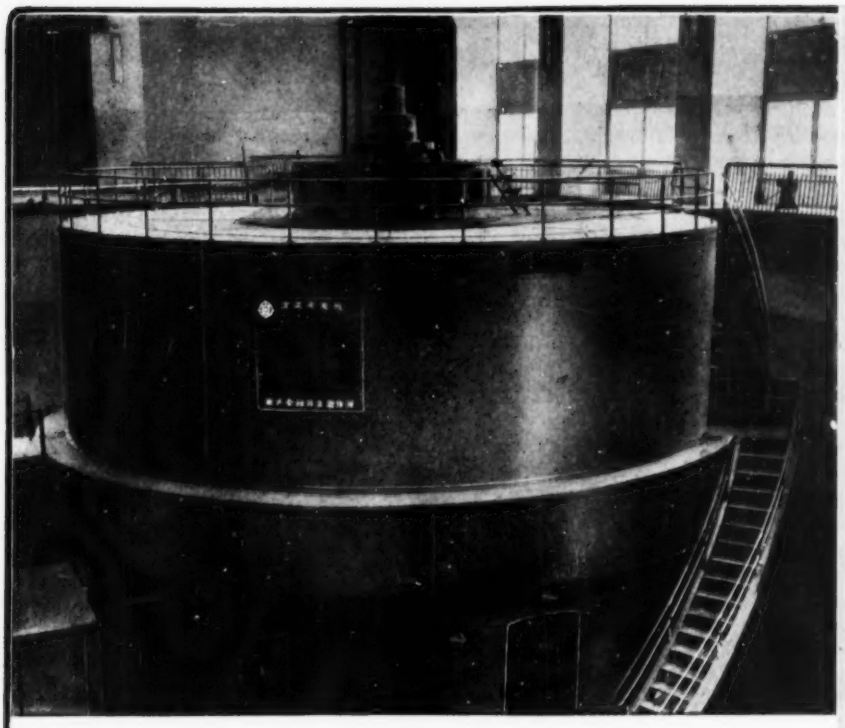
Built by Burroughs Corp., the computer is extremely flexible. It can be rearranged to make a computer materially different in function and logical characteristics. Thus it can solve a wide range of problems.

In Europe, business-machine manufacturers are rapidly developing electronic computers. England has had 350 engineers, mathematicians, and research scientists developing electronic office machines for the past 5 years.

Scotland, Belgium, Netherlands, and Italy have computer programs of their own. In the not-too-distant future, electronic "brains" will be commonplace equipment for smoothing business processes the world over.

• **Mobile Two-Way Radio**—This is still a brand new field. Discounting marine and aeronautic applications, mobile two-way radio has a long way to go. Police organizations are converting to two-way radio. So are many taxicab groups and truck- and bus-fleet operators.

Utility, oil, lumber, mining and manufacturing companies are all finding two-way radio a valuable tool. The construction industry represents a relatively new field



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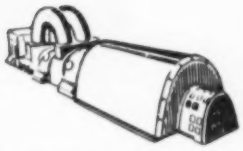
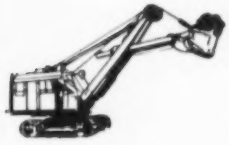


Electric Power Station & Sub-Station

Rolling-Stock



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Electronics: New Tool for Medicine

What electronics can do and what it will do are prime subjects for discussion whenever a group of electronics engineers gets together. One group, the U. S. National Conference on Airborne Electronics, heard William S. Halligan, president of Hallicrafters Co., talk about new applications for electronics in medicine.

"A new technique is 'telegnosis'," he said. "With facsimile equipment, X-rays can be transmitted to specialists anywhere in the country and important diagnoses made in a minimum of time by the most qualified men.

"General Electric is testing a 'robot psychologist,' designed to help military psychologists put a square peg in a square hole. This device quickly computes problems in statistical psychology that would require months by hand computation methods.

"Another instrument provides fast, accurate counting of blood cells. Still other devices are in use for seeing through the body and producing artificial fevers by electrons." And here Mr. Halligan looked into the future.

"It is not inconceivable that we will have electronic devices that act as substitutes for heart and lungs while these organs are operated on."

for expansion for this type of electronics.

In Cleveland, a supermarket operates a walkie-talkie system connecting all departments. One of the things the system does is to speed restocking of shelves. A clerk checks the shelves and advises the stockroom, via the walkie-talkie, which items need restocking.

• **Microwave Relay**—Border-to-border television programming is one application for this development. Another is long-distance telephony. Many programs or conversations can be sent long distances on narrowly focussed microwave beams between towers and stations spaced 10 to 50 miles.

In Japan, a seven-station two-way microwave-relay system links outlets in Tokyo, Nagoya, and Osaka. It provides facilities to both public and private television broadcasting companies. The relay is 280 miles long and includes hops of nearly 60 miles. Other areas are planned for microwave-relay systems.

Great potential lies in the use of microwave-relay communication along the many miles of gas and oil pipe lines. Only a small portion of this market has been tapped. Utilities and railroads also are moving into this communication method. With mobile radio, it provides an all-weather, industrial communication system having unique properties.

These are the four areas possessing major growth potential. But what of the electronics industry as a whole? Two developments stand out: (1) the transistor, for the possibilities it offers and (2) color television, for its potential as a money maker.

The transistor itself is no longer news. But hardly a day goes by without new applications for it being uncovered. At present most transistor output goes to the military. But that does not prevent the scientists from speculating on commercial uses.

It is expected that the transistor will form the basis for a new electronics industry. Its effect is to remove present limitations on electronic progress. The vacuum tube is short-lived, fragile, too big and generates too much heat. The transistor has none of these shortcomings.

But don't think that the transistor will eliminate the vacuum tube. According to the scientists, vacuum tubes will be needed for electronic devices made possible by the transistor. So the market for vacuum tubes is likely to grow, rather than fall off.

Black-and-white television has nowhere approached its full growth. But already color television is pushing it hard. Most countries have experimental color-television programs in progress. In the U. S. color television is on a limited commercial-production basis. So the opportunities for growth here are staggering.

As the basic electronics industry grows, so will the host of businesses that serve it. The vacuum-tube manufacturing business is a good example. Nearly twice as many receiving tubes will be needed by 1960 for replacement purposes as are needed now. For prime use in electronics equipment, the number of tubes needed probably will never go below 350-million on a world-wide basis.

Another reason for continuing growth is the small outlay needed to get into the business. A few good enginers with a few good ideas and a few thousand dollars can put an enterprising company into the business of making a new electronic component. If it's new and different, someone is sure to find a use for it.

It takes just a little imagination to see what lies ahead for the electronics industry. The basic tools are ready today. And the pressure of increasingly complex business practices and industrial processing will eventually force these tools into use. Meanwhile, out of the laboratories and electronic devices themselves will come a new generation of tools with still more promise for the future.

Coming Next Month

Watch for a special report to management on the plastic industry. We'll tell you where it is, where it's going, latest developments. We plan to cover the industry in several leading countries, as well as the U. S. If you make plastics, supply materials to the industry, or use plastics or plastics products, this one is worth waiting and watching for. Write us if you want more articles like this one, or the electronics report in this issue. Tell us what industries you would like to see covered—it's the only way we can know what you want.

Solar Cell Converts Sunlight into Power

The first successful device to convert useful amounts of the sun's energy directly and efficiently into electricity was demonstrated recently by Bell Telephone Laboratories.

The "solar cell," when exposed to light from the sun or an electric bulb, produced enough electricity to power a radio-telephone "walkie-talkie," transmit voices over a standard telephone hookup, and work an electrical toy. The key converting element is silicon, used in much the same form as the silicon in many transistors. In the demonstrations, the metal took the form of small half-disks.

Special treatment of the silicon enables it to convert solar energy. By a tricky metallurgical process, Bell scientists remove all impurities from a piece of ordinary silicon. Then they put an infinitesimal amount of the impurities—a little boron and a little arsenic—back into the metal. These impurities penetrate no deeper than 0.0001 in. below the disk's surface. The result is a piece of metal that is extremely sensitive to light.

When light strikes it, certain electrons on the metal's surface are set free. They move across the face of the metal. This small current flow is enough to create one-fifth of a watt of power from each disk.—Business Wk, May 1, p100

Power Steering by Air

A new power-steering system for trucks, buses, and off-the-road equipment has been developed by Bendix-Westinghouse Automotive Air Brake Co. It uses compressed air supplied by an engine-driven air brake compressor as a power source.

Complete self-sufficiency features the equipment, as the air compressor has an unlimited replenishing source and only one medium is necessary for both braking and steering. Normal wheel feel is retained and steering wheel spinback or retrieve remains the same as in manual control.

The new system provides for the addition of power and control units to existing steering mechanisms without disturbing the steering geometry or characteristics of the vehicle.—Auto Ind, Apr 15, p53

Chemical Developments

▶ **Silicone Rubber**—RTV Silastic, a new silicone rubber, air-cures in sections up to ½-in. thick without heat, pressure, or full exposure to air. It develops high- and low-temperature stability, water repellency, and chemical resistance within 24 hr. Dow Corning Corp., Midland, Mich., makes it.—p154

▶ **Insulation Resin** — Scotchcast No. 3, made by Minnesota Mining & Mfg. Co., St. Paul 6, Minn., is an epoxy resin. It can be mixed in large batches and used for days, whereas most epoxy resins set in an hour or two. Uses: electrical machinery to replace varnish-impregnated paper and cloth.—p154

▶ **Flooring** — Metal-Seeded Dynapakt process adds ¼-in. layer of iron-chip aggregate to concrete floors. It provides a non-spalling, non-crumbling, non-slip surface. Maker is Flash-Stone Co., 3723 Pulaski Ave., Philadelphia, Pa.—Chem Eng, May, p160

Preselection Controls Boring-Mill Settings

New German boring mill, made by Berliner Maschinenbau A. G., features rapid positioning of the spindle head in relation to the work. Co-ordinates are set through two groups of counterwheels on the head, which control end measuring rods. Rods are totally enclosed.

One group of rods is for transverse and the other for longitudinal movements of the spindle head. Rod combinations are selected with the aid of digits on the dials, as on a calculating machine.

The setting can be preselected while the machine is operating. When the spindle is withdrawn, depressing a pushbutton brings the next combinations of end measures automatically into operation.

The machine drills, bores, and mills on a production basis without special tooling and to near jig-borer accuracy. Settings to within ±0.0002 in. are practicable. The machine can be equipped for automatic coordinate setting from a punched card.—Mach, Mar 20, p487

U. S. Navy VTO Fighters Due to Fly Soon

Scheduled to fly for the first time this summer or fall are the U. S. Navy's two vertical-takeoff fighter prototypes shown above—the Lockheed XFV-1 (left) and Convair XFY-1. Each is powered by an Allison T40 turboprop engine developing 5,500 equivalent-shaft-horsepower and driving two contra-rotating propellers. Planes are designed to take off vertically, swing into horizontal flight, and land vertically on four-point tail landing gear with castering wheels. Landing method calls for a return to vertical position and slow descent while "hanging" the plane on its propellers. Rotating seat permits pilot to keep same relative position during vertical and horizontal flight. XFV-1's level top speed is "about 500 mi. per hr."—Aviation Wk, Apr 19, p14, 18; Mar 22, p14

behind this name . . . .

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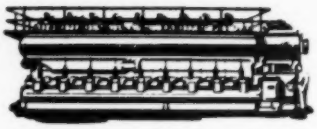
engine building experience and service *Second to None*

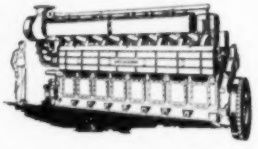
For over a half century, Nordberg has been solving power problems efficiently and economically the world over. The acquisition of the Busch-Sulzer Bros. Diesel Engine Co., now a division of Nordberg, combines America's *first* builder of Diesel engines with the builder of America's *largest* line of heavy duty Diesel engines . . . in sizes from 10 to over 10,000 horsepower.

This unequalled engine building experience is your assurance that the finest in technical and practical ability, together with an outstanding service reputation, stands behind every Nordberg stationary and marine engine installation.

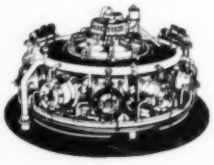
Nordberg builds both two-cycle and four-cycle engines, including Diesel, Gas and Duafuel® types. With the extremely wide range of sizes and types to choose from you are assured of the right engine to meet each specific power application. Write for further information, outlining your power requirements.



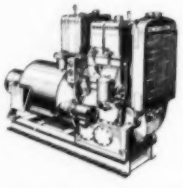
Nordberg 2-cycle Diesels are built in sizes from 1570 to 10,800 H.P. Two-cycle Duafuel® engines are built in sizes from 1570 H.P. upward. They operate on gas or fuel oil, or any combination of both—and are instantly changed over from one fuel to another, without changing speed or load.



Nordberg 4-cycle *SUPAIRTHERMAL* Engines are available for Diesel, Duafuel® or spark-fired gas operation, in sizes from 535 to 4260 H.P. Other 4-cycle models available from 220 H.P. upwards.



Nordberg 2-cycle Radial engines develop 1950 to 2125 H.P. or 1250 to 1500 K.W. at 400 R.P.M., as oil burning Diesels, as spark-fired gas engines, and as Duafuel® engines.



Nordberg "4FS" Diesel engines are built in 1, 2 and 3-cylinder sizes for generating electricity, pumping and straight power applications. These "packaged" power units develop from 10 to 45 H.P. or 6 to 30 K.W.

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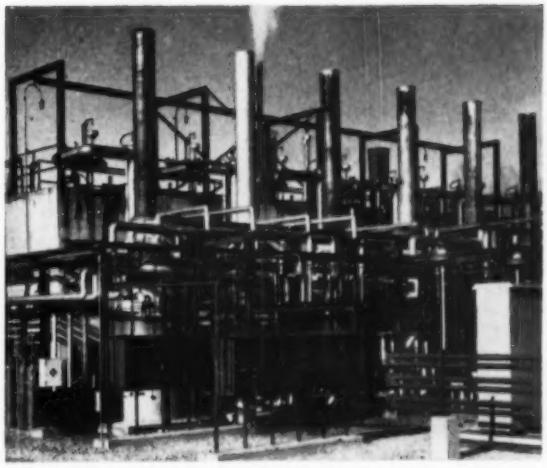
XD154

This Month's How To . . .

. . . make synthetic ammonia

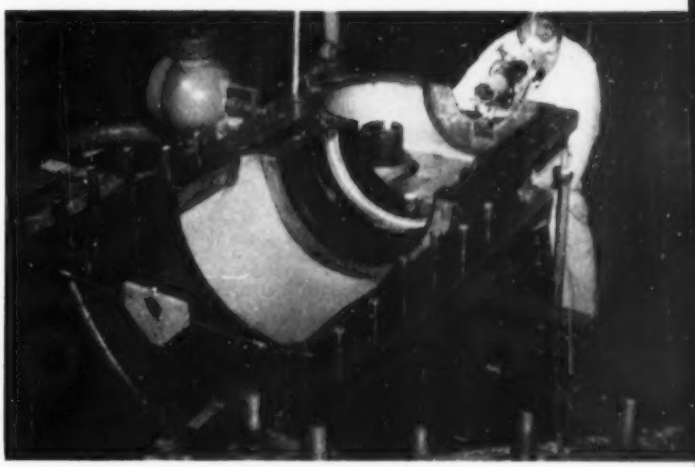


In the conventional ammonia process, steam reacts with natural gas, air is added, carbon monoxide and carbon dioxide are removed, and the remaining nitrogen and hydrogen are converted to ammonia.

Spencer Chemical Co., in its new plant at Vicksburg, Miss., burns natural gas with oxygen under pressure, making hydrogen and carbon monoxide. After the monoxide is removed, hydrogen combines with nitrogen (from liquid-air plant) to form ammonia.

Advantages claimed over the conventional process include (1) lower-pressure operation and (2) 15% less natural gas needed.—Chem Eng, May, p332

. . . align bearings with telescope

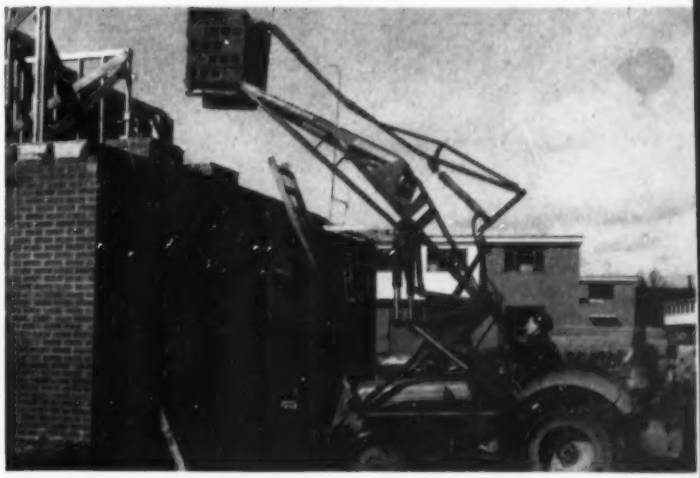


A telescope is used to align turbine generators at Consolidated Edison Co. of New York. This method is more accurate, simpler, and faster than the old tight-wire method.

The new method uses steel-plate target holders shaped to hold three inside micrometers. With targets usually placed in first and last bearing bores of machinery to be aligned, micrometers are adjusted to position the cross-wires in exact center of bearing bores.

The telescope is set on zero, and the instrument adjusted horizontally and vertically so target cross-wires and telescope reticle cross-hairs are in the same line of sight. This line of sight then becomes a reference line for the entire length of machine.—Power, May, p114

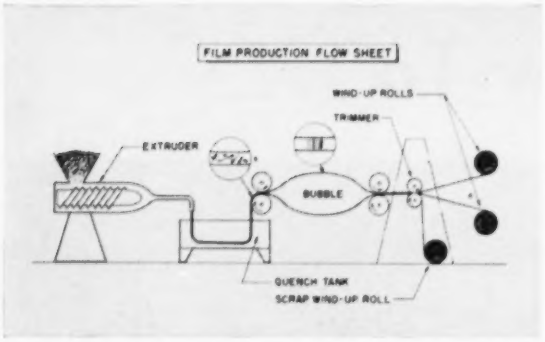
. . . cut masonry costs



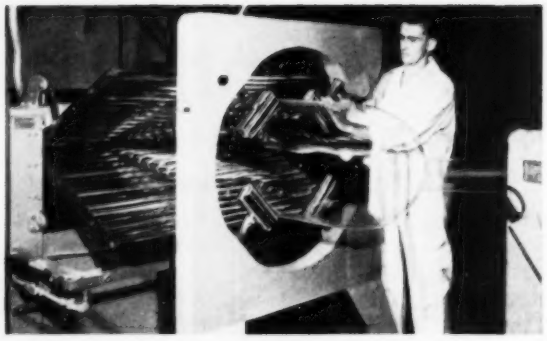
Carting masonry materials to and on the job can cost money. West Brick Buggy Corp. has come up with a system of handling palletized masonry materials that saves money.

The company's system enables the pallet-package to be transported from the manufacturing plant of origin to the construction area, through the job site, up to hoist, and around the scaffold to the bricklayer without disturbing the original palletized material.

Key equipment for the system is a wooden pallet, a lightweight hand-propelled four-wheeled mortar board, and a specially designed front-end fork-lift attachment on a standard Case tractor.—Const Meth & Equip, May, p90



EXTRUSION PROCESS forms bubble of saran film



CRYSTAL ORIENTATION occurs here

Saran Film: Its Properties

Saran film's unusual properties make it ideal for certain packages. Here's a review of how it's made, where it's used, and how it can be fabricated

SMALL AMOUNTS of vinyl chloride added to vinylidene chloride make a material with unusual properties. Called saran and made by the Dow Chemical Co., it possesses a crystalline structure. It has an exceptionally low gas permeability in film form. And it has an outstanding chemical resistance and low water-vapor transmission.

Saran film is produced by an extrusion process. Crystal orientation takes place by changing the tube-like amorphous material as it is extruded into a thinner-walled tube by blowing. This multi-directional orientation can produce strong, flexible films from 0.0005 to 0.002 in. thick, and heavier.

Primary use for the film is food packaging. Present applications include cheese, meat packing, dried fruit, and confectionary products. It is also used in chemical, pharmaceutical and liquor industries. And it is an ideal cap-liner material. Special uses include packaging of ground-in-oil paint pigments, putty and caulking compounds, and many other products.

Rheem Mfg. Co. laminates saran film to sheet metal before forming and welding the sheet into a shipping drum. Frozen-food processors and shippers are using this type of drum as a replacement for more expensive stainless-steel drums.

Somewhat unusual methods are needed to fabricate saran film. For example, it cannot be heat-sealed in the same manner as in heat-sealing cellophane or some thermoplastic-resin films. The reason is the small difference between its sharp melting point and softening point, as well as its tendency to shrink under heat. But this problem has been solved with electronic sealing.

Many automatic bag machines, as well as fabricating and filling equipment operating with saran film, employ this method of sealing. It is both fast and positive.

Not all packaging applications call for a true seal or weld. Most natural cheese wraps are sealed with a "peel-type" seal. This seal is similar to that obtained with certain packaging materials that are coated to permit heat-sealing. The seal is made on hand sealing equipment, except that a silicone-treated glass cloth is placed over the heating surface to prevent the saran film from sticking to the hot metal.

Saran film is available in a number of types. These vary in clarity and slip. The type selected depends on the end use. Sometimes a less-clingy film facilitates handling on automatic machines; this usually means a more opaque film.

Gages from 0.0005 to 0.002 in. are available in a single thickness. Some users prefer double-wound films—that is, two single thicknesses wound together. This type possesses added toughness, more scuff resistance, and less danger of leaks and tears. With double-wound saran film, printing can be locked in between the plies. This not only eliminates possible product contamination from the ink, but also prevents smearing and improves the gloss.

Saran, because of its properties, could possibly replace metal cans or glass jars in many applications. It can withstand processing temperatures under proper conditions. As a container, it would be lighter to ship, easier to dispose of, and perhaps more convenient to open. —Mod Packaging, Apr. p117

Portable Thulium X-ray

Portable radiographic equipment has been developed by the Argonne National Laboratory by using thulium-700 as the radiation source. The unit weighs less than 7 lb. and will find its major medical uses in Army field hospitals, small naval vessels, construction camps. Industrial uses will include inspection of thin castings

(up to 1 in. of steel or 3 in. of aluminum) and measurement of density or height of liquids.

The thulium unit is not expected to supersede conventional X-ray tubes. The latter give results that are unmatched by thulium sources. But the thulium units produce radiographs acceptable for many purposes and can be used where standard X-ray facilities cannot easily be made available.—Nucleonics, May, p35

Tubed Sugar Service, New for Packaging

New single-service package for sugar is the first to depart from conventional pouch constructions. It is tube-shaped and can be attractively served in sugar bowls or as part of a place setting.

Utah-Idaho Sugar Co. introduced the cylindrical pack. Its red, white and blue barber-pole design provides a colorful table accessory. Clear cellophane emphasizes the purity and free-flowing characteristics of the product.

The package measures 5½ in. long and is one-and-one-half times as thick as a pencil. A round opening for easy pouring is provided when the sealed top of the tube is torn off horizontally.

Slight pressure between the thumb and forefinger retains any part of the contents not desired. Contents are ¼ oz., approximately one rounded teaspoon, or an individual serving.—Mod Packaging, Apr, p102

Hammer Pulls Sheetpiles

Steel sheetpiling for the new Statler Hotel, in Dallas, Texas, was extracted by a pile-driver hammer rigged in an unusual fashion. The method is not new, but contractor Robert E. McKee added some improvements.

The hammer is inverted as usual. A heavy arched steel frame with a hole for the crane shackle is bolted atop the hammer. Within the frame, a loose bar anvil rests across the hammer's regular flat anvil block and extends out opposite sides. A similar round bar extends through two frames bolted to the hammer tie rods at the bottom.

Five wraps of wire rope tie top and bottom bars together. A steel plate yoke, carrying pinned pile clamps, is free to turn around the lower bar, thus giving a swivel action that makes it easy to lay extracted piles down exactly as wanted.—Const Meth & Equip, May, p99

American-Built Plant Spurs Turkish Lignite

Increased demand for a high-type fuel, sparked by the industrialization of Turkey, has resulted in erection of this ultra-modern coal-preparation plant at Soma, Turkey, where a lignite deposit has been under development. Plant supplies coal for industry and metallurgical coal. Eti Bank of Ankara operates the plant. It was designed, equipped and built by McNally-Pittsburg Mfg. Corp.—Coal Age, April, p135

Editor's Letter

Dear Reader:

If you turn back and look at the front cover, you'll see in the upper left-hand corner either OVERSEAS EDITION or LATIN AMERICAN EDITION, depending on where you live.

For some time, we have felt that we could serve each of you better editorially if we could limit the extremely wide requirements of all our readers. As the Digest circulates in over 90 countries and territories, it has been most difficult to create an editorial approach that would apply to all of you.

So we have decided to make a logical breakdown of circulation coverage to narrow reader interests and needs. In the future, we plan to direct our editorial content, particularly of the business and economic type, to satisfy regional requirement.

In Latin America, for example, there is a community of interest that we hope to cater to; doing so can only result in your getting more of the information you read the Digest for—the information that helps you run your business more efficiently and profitably, do your job more effectively. We sincerely hope you approve, and benefit from, this change.

I want to emphasize one thing. In making this change to split editions, we will not change, even slightly, our principal objective: to offer to you the fullest coverage we can on business, industrial and technical developments, not only from the United States but from the rest of the world as well. We shall continue to give you specific coverage on business and economic trends, management methods, technical advances. We shall continue to dedicate ourselves to the freest possible interchange of ideas and information among the free nations of the world.

Sincerely yours,

Harry S. Whalen

Editor

Truck-Trailer Vessels For Coastwise Shipping

A unique trucking-shipping service will go into operation sometime next year on the East Coast of the U. S. The economies of lower-cost water transportation coupled with the flexibility of modern motor freight service are to be combined through the use of special trailer-transport ships.

The new ships will be 650 ft. long and have a speed of up to 20 knots. The twin screw turbine-driven vessels are designed to carry approximately 240 trailers. Each ship will have two enclosed trailer decks, plus auxiliary space in the hold for additional cargo.

Trailers at the dock will have direct access to the two enclosed ship decks through the stern. Units will be driven off and on the ship over variable-height double-deck ramps installed on the shore. Complete loading and unloading cycle is expected to consume 4 hr. per ship.

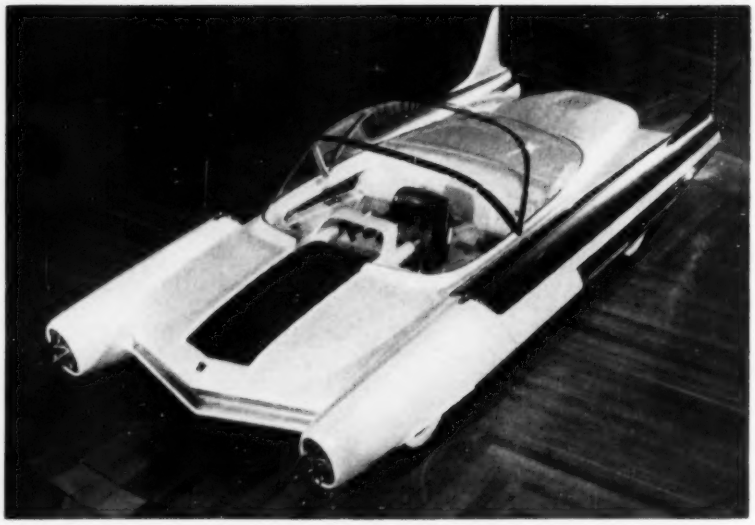
The sea-land service, by permitting fully loaded motor trailers to be driven directly on and off the ships, will automatically eliminate costly movement of individual carloads, truckloads or fork-lift truckloads to dockside for additional handling aboard a conventional ship.—Marine Eng, Apr, p47

Electric Glass Furnace

Modernization of an electric glass-making furnace at Northwestern Glass Co., Seattle, replaced carbon electrodes with molybdenum electrodes. The furnace can now make flint glass as well as amber glass.

The molybdenum electrodes, of small diameter, extend into the furnace through the sidewalls. They make better contact with the hot glass melt as carbon tends to repel glass.

Although molybdenum electrodes cost more than carbon electrodes, they are expected to last longer. In amber-glass production, they should operate the entire time between furnace shutdowns for renovation. The increased oxidation in making flint glass will mean a shorter life than for amber glass.—Chem Eng, May, p136



THIS IS the Ford Motor Co.'s idea of a "future experimental" car. Its lower lines, plastic body, and "bubble canopy" are pointers to what you may find in . . .

The Automobile of 1960

U. S. designers look for lower, longer and lighter cars by 1960. Engines will be more powerful, gadgets plentiful. Frames will be stronger and safer

THE CAR-BUYING PUBLIC wants changes in its automobiles, but it wants them slowly. That is the conclusion reached by American stylists and engineers. So they are sketching cars of the next few years on the basis of an orderly progression from the cars of today.

But what of the automobile of 1960 and beyond? Today the designers talk only in terms of broad trends:

• **Cars will get lower**—perhaps longer and lighter, too. Stylists feel the ultimate height is somewhere between 54 in. and 56 in. (typical height today: 60 in.).

• **More powerful engines** are definitely on the way. The survivor may be a higher compression engine or a new type such as the gas turbine. General Motors and Chrysler are among companies experimenting with gas-turbine units that are simpler, lighter, and more efficient than gasoline engines. But the many difficulties still to be solved make it doubtful that the new engines will be ready in large numbers by 1960. Meanwhile, much work is being done on new engines using powerful fuels developed for guided missiles. They may be ready in 1960.

• **A bigger glass area** is probably the most obvious trend. By 1960 the public may be ready for the "bubble canopy"—a transparent blister clamped down on the car's side and covering the entire seating area.

Other pointers for 1960:

Size: At Studebaker Corp., Robert Bourke of Raymond Loewy Associates says: "Cars of the future must become more functional and more restrained in size, or we won't be able to get them all on the roads." Cars of the future, he feels, will weigh much less—perhaps 2,000 lb. instead of 4,000 lb., which now is common.

Use of light materials (such as plastics), combined with new suspension methods to make cars handle easily and hold the road, will eventually overcome prejudices against lighter cars. Some designers are experimenting with air suspension instead of springs. They use an air-controlled "doughnut" suspension, in which the

weight rests on a unit much like an inner tube.

Brakes: The car of 1960 will need more than even today's power brakes to guarantee safety. New brakes will pave the way for 300-hp. or 400-hp. engines.

Features: By 1960, the average car may have two dozen power-operated push-button features run by a central electro-hydraulic system instead of by separate motors, as today.

• Smaller, lower cars will need new doors (standard doors would underhang curbs). The solution seems to lie in hydraulically operated doors that slide up or down or part in the middle. Locks and latches will disappear. A single control will lock all doors.

• Keeping bigger windshields or canopies clean will need more than conventional wipers. The answer seems to lie in some kind of squeegee device and hot water.

• Instantaneous heating may replace standard heaters that require a warm-up period.

Safety: For greater strength and safety, engineers will improve frames. The tubular frame, now used in most European cars, will find wider adoption.—Business Wk, May 8, p62

Water Stresses Wall of Unfinished Reservoir

In France a new method of building reinforced concrete reservoirs involves filling the partially concreted structure with water. The force exerted by the water stresses exposed tensile reinforcing in the exterior slab of a hollow arch-wall. Then concreting is completed.

The hollow wall of the reservoir is made up of a series of small concrete arches. The arches face in and are tied by flat outside slabs that make the outside reservoir wall look polygonal.

Like segments of cylinders, the small concrete arches forming the inner wall of the reservoir are in compression when the structure is full of water. The flat outside slabs, tying the ends of the arches together, are tension members containing high-strength tensile reinforcing placed annularly.

The reservoir is 118 ft. in dia. and holds more than 2,100,000 gal. Concrete-arch thickness is only 2½ in. Little more than half the concrete required in conventional construction was needed. And less than half the reinforcing steel was used.—Eng News-Rec, Apr 29, p61

Magnetic 'Broom' Protects Jet Engines

Attached to the rear of this motorized sweeper at Grumman Engineering Corp.'s plant is a magnetic "broom." Its job is to clear runways and hangar areas of small metal objects that might be sucked into jet engines and damage them. Made by Eriez Co., of Erie, Pa., the magnetic Super Sweeper is produced in various sizes and strengths and can be hand-operated. Inside is a 48-in.-long magnet.—Aviation Week, Apr 19, p76

(Advertisement)

Electrical Insulating

Tapes produced by Irvington conform to irregular surfaces

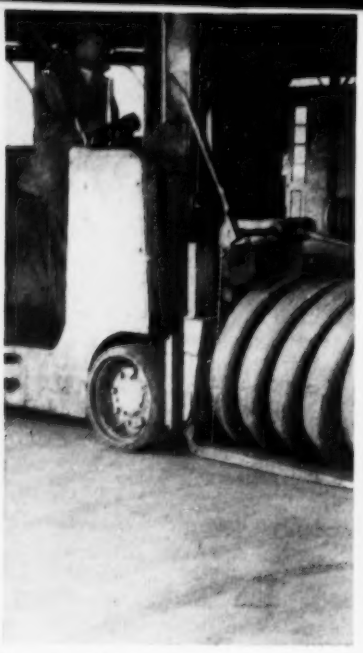
With its combination of high tensile strength and elongation, Irvington Varnished Cambric in the form of Seamless Bias Tape provides firm, compact wrappings of high dielectric strength around irregular surfaces, such as armature and field coils, transformer windings and cable splices.

Varnished cambric—one of the earliest products developed and **continuously improved** by Irvington during nearly 50 years of service to the electrical industry—remains today one of the most satisfactory for a wide range of applications by industry. It is also used by Irvington in the manufacture of slot insulation, an Irvington product consisting of Varnished Cambric bonded to a fiber backing. In addition to the varnishes developed by Irvington for use in the manufacture of their own Varnished Cambric, a complete line of superior insulating varnishes is also available to industry for impregnation of windings.

Other needs of the electrical industry have been anticipated and met at Irvington, during the past half-century, by the development of entirely new types of materials, notably those specifically intended for continuous operation at a temperature of 180° C. which is designated in the U. S. A. as Class "H" A.I.E.E. temperature. Base materials used include glass cloth and asbestos. Treating and coating materials include silicone resins, silicone rubber and Teflon* resin.

To assist the electrical industry throughout the world in making the most effective use of Irvington's comprehensive insulation line, representatives in more than 30 countries are prepared to supply technical literature and samples for testing purposes, as well as to offer advice on product performance and applications. Your Irvington representative is ready to assist you in your problems. Irvington Varnish & Insulator, Division of Minnesota Mining & Manufacturing Company, Irvington 11, New Jersey, U. S. A.

* T.M. Reg. U.S. Pat. Off. by E. I. du Pont



Concrete?

Wood Block?

Hardwood?

Which One Would You Choose? It's a Key Decision in . . .

Selecting a Plant Floor

Your plant floor can be one of your biggest problems—especially if it is the wrong floor to begin with. If you are resurfacing an old floor or choosing a new one, a four-point program can help you

THE WRONG FLOOR for your plant can mean trouble. For the maintenance department, it can mean frequent repairs and resurfacing. For the production department, it can mean spilled loads, inefficient handling, interruptions to production.

And it is an industrial-relations problem, as well. It can cause high accident frequency, fire hazards, poor working conditions. It can even contribute to low morale.

If you have the wrong floor, it may pay to resurface with the right one. And if you are choosing a floor for a new building, you will want to pick one that will last for years to come.

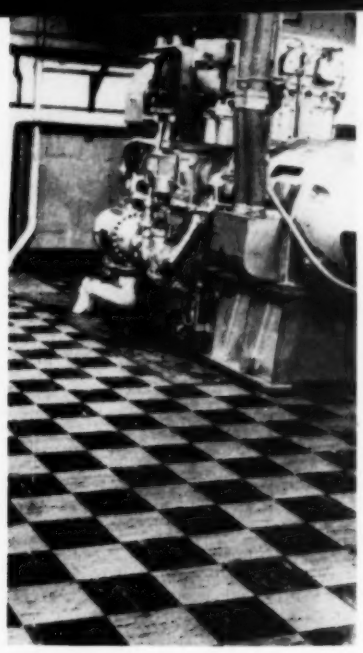
No single type of floor will answer every need. But there is a "best" floor for every problem. These are the steps you can take to get the right floor every time.

1. Divide the plant into areas based on the kind of service each floor will get. Every special-purpose area the plant contains should be considered. And all mechanical and chemical processes should be listed for each area.

2. Determine service requirements for each plant area. A checklist of the information needed will help. These points should be covered:

- **Size of area.** This will help estimate floor costs. It will also be an important consideration in choosing a flooring material.
- **Kind of traffic.** What is the type and frequency? Is it continuous or infrequent, fast or slow? The more exactly the type of traffic is noted, the easier it is to select the right floor.
- **Exact load requirements.** Type of load (standing, impact, rolling, sliding, vibrating), weight, and concentration should be included.
- **Exposure to water.** Will water remain standing for long periods? Is water hot or cold? Is humidity or condensation a factor in area? Some types of flooring cannot stand exposure to water.
- **Chemical exposure.** Grease, acids, alkalis, foods, or other specific chemicals that come in contact with the floor should be noted. Corrosives should be listed by exact name. A floor may resist one type of acid and break down under another.
- **Appearance.** If appearance is important in office, cafeteria, or employee service areas, there are many types of floors available that wear well, clean easily, and brighten up the plant.
- **Extremes of temperature.** Asphalt tile, for instance, may become brittle at low temperatures and soft enough to indent easily at high temperatures. Extremely high temperatures can also weaken concrete made with portland cement.
- **Grade location.** Is the floor above

Mastic?



Asphalt Tile?

Linoleum?

or below grade? Some floors cannot be laid below grade.

• **Weather exposure.** Is floor area indoors or outdoors? Some floors may be used indoors only. Others may be used indoors and outdoors.

• **Plant hazards.** Is floor area in a hazardous location? Are there present any fine powders or explosive materials that may be set off by a spark? Does process constitute a fire hazard? There are floors for any or all of these conditions.

• **Product cleanliness.** Is extreme cleanliness important for your product quality? Some floors naturally dust; others are natural dirt collectors. Still others may be porous or have cracks and crevices where bacteria can collect, cause odors, and endanger product quality. These floors are no good where extreme cleanliness is necessary.

• **Cleaning requirements.** Will floor be flushed down several times a day? Is there a special type of dirt, grease, or other spillage that requires special types of cleaning? Some floors can withstand harsh cleaning methods and materials, while others cannot.

3. Know the types of floors available. The various types of floors for each area can now be considered. Helpful factors:

• Floor manufacturers have detailed information on all types of floors.

• A flooring expert, an architect, a building engineer, or contractor, all have experience in floor selection. But they must know exactly what kinds of service to which floors will be exposed.

4. Choose the best floor. The final decision will be based on a number of factors.

• **Wear resistance.** The only way to know exactly how one floor compares with another is to test them under identical conditions. Flooring manufacturers will set up small test areas of their materials in locations where all types get the same treatment. The test areas should be installed and maintained exactly according to the manufacturers' specifications. Then the floors should be watched closely. From these test areas, pick the floor or floors that stand up the best.

• **Future use.** It is a good idea to consider future layout changes that may make important changes in floor plans. This may require heavier-duty or acid-resistant floors.

It will be as much as four times cheaper in the long run to install tomorrow's floor today than to scrap today's floor tomorrow.

• **Standardization.** Obviously 20 different types of floor in a plant with 100,000-sq.-ft. area is not practical. Floors should meet the most universal requirements. If a floor area is slightly overdesigned because the area was standardized, it may well pay for itself in easier, lower-cost maintenance.

• **Maintenance.** Floor upkeep can be expensive. First cost of a floor is often insignificant, compared with yearly maintenance costs.

A plant engineer picked one floor over another because he saved 50¢ a square foot on the original cost. But he did not realize it would cost him 20¢ more per square foot per year to maintain the floor he chose.

The flooring manufacturer can usually provide a good estimate of how much maintenance is necessary. The requirement is a floor that is easy to clean and keep clean with minimum tie-up of traffic. It is a decisive consideration when comparing two or three floors that give just about the same service.

• **First cost.** This is the final consideration. Low price is often not the best buy. If floor selection is an engineering decision, first cost automatically falls into proper relationship to other long-range benefits.

Even the best possible floor for given conditions is not enough. Workmanship in laying a floor affects its quality. Poor workmanship may cancel the advantages that one floor material may have over another. Excellent workmanship, on the other hand, combined with quality materials, will provide a floor that will give satisfying service.—Factory, May, p84

Titanium-Silver Valve

King-size titanium and silver diaphragm control valve was designed by Minneapolis-Honeywell Regulator Co. to handle highly corrosive liquids. Trim was machined from solid titanium. A silver sleeve, 3/32 in. thick, lines the inlet bore to increase body life of the valve.—Prod Eng, May, p205

Turboprop-Jet B-47 Will Fly This Summer

Boeing Airplane Co.'s XB-47D, powered by a combination of turboprop and turbojet engines, is scheduled to fly this summer. In this experimental model, one Wright Aernautical T49 turboprop will be substituted for each inboard pod installation housing two General Electric J47 turbojets.

The experimental version thus becomes a four-engine airplane, with one T49 inboard and one J47 outboard on each wing, in contrast to the six-jet B-47. Fitted with very wide four-blade Curtis Turboelectric propellers, each T49 has about the same thrust as two J47's. The new powerplant arrangement aims to increase range substantially.

Other new turboprop-powered planes to fly soon include:

- Boeing C-97J Stratofreighter, powered by four Pratt & Whitney Aircraft T34's.
- Lockhead C-130A, powered with four Allison T56's.
- Lockhead XFV-1 and Convair XFY-1 vertical-takeoff fighters (see page 17).—Aviation Wk, Apr 19, p14

New Tooling Ideas

Show tips for your shop: automatic gaging, optical tooling, ultrasonic machining, abrasive-belt machining, subzero chilling.—An original Digest article

MORE THAN 20,000 tool engineers crowded the exhibits of 500 manufacturers and the seminar sessions at this year's industrial exposition of the American Society of Tool Engineers. They were there to see the latest tools and equipment offered for cutting production costs, increasing the efficiency of small-lot runs, and automating mass-production runs.

On machine tools, the European manufacturers dominated the show. They brought from Belgium, Britain, France, Germany, and Sweden the machines that have pioneered since the war in modern design.

Of the other equipment exhibited, only a few outstanding examples can be mentioned. One exhibit showed automated inspection; products were delivered to a conveyor on the inspection machine, carried through two gaging stations, automatically sorted according to size, and automatically rejected if defective. Gaging rate was 1,500 per hr.

A whiteprint machine, to be marketed in the fall, offers maximum printing capacity at moderate cost. An electronic speed drive allows instant changes in speed from 0 to 30 ft. per min. A new developer system automatically compensates the ammonia flow for machine speed.

A contour projector showed watch gears at 30 times actual size. This magnification is claimed to open up new fields for study of small mechanisms in operation. Other inspection equipment included a variety of air gages; their new designs should accelerate the trend to air gaging on the production floor.

Optical tooling instruments were shown for setting points in assembly work, gaging tool and die wear, and general aligning purposes. The system works by (1) establishing a base reference line with an alignment telescope and (2) setting up vertical planes perpendicular to that line with a jig transit or an optical transit square.

Technical sessions covered plant management, automation, machining, quality control, forming, and assembly. Here's a sampling of what the tool engineers heard:

- **Machining**—Major reasons for transfer-machine development were an increasingly difficult labor market and more complex products with close tolerances and in greater volume. Their use is expanding. The major units of all new V-8 automobile engines are processed on transfer-type machines. No other type of machine allows 20 to 30 passes with a wide variety of tools at 60 to 125 operations per min.

Ultrasonic machining (McG-H Digest, Oct' 53, p44) permits fabrication of dies from solid carbide blanks, cutting of chip breakers, drilling of ceramic spacers, and many similar jobs. Other materials successfully machined include glass, ferrite, glass-bonded mica, granite, hardened steel, quartz, ruby, sapphire, and tungsten.

Accuracy control is a primary requisite in precision machining. A new refinement is jigless boring, which can be applied to single-piece or quantity production. Cutting is done by a single-point tool. Positioning of the machine table and spindle head is performed automatically by a sequenced electrical cycle, thereby closely controlling hole spacing in the work.

Coated abrasive belts now handle a variety of machining jobs. Tolerances as low as 0.00025 in. can be held on flat stock. One application sands mica sheets to this tolerance on single-drum sanders with spirally wound coated abrasives as the cutting agent. Drums are 50 in. wide and 13 in. in dia. The method is so precise that newsprint can be sanded from a

newspaper without cutting through the paper.

• **Gaging and Inspection**—Automatic air-gaging is an outgrowth of single-dimension and multiple gaging. Electro-pneumatic gaging heads convert pressure changes caused by size variations into signals that actuate size sorting or acceptance and rejection mechanisms. One automatic gage, a 20-ton unit, checks fully loaded 90-mm. shells. Each shell is carried through a two-section chamber gage simulating the actual gun chamber. A self-contained electro-pneumatic unit can be mounted on machine tools for completely automatic inspection, classification, and segregation by size, and even tied into the machine-control system as a feedback device.

• **Processing**—Ultrasonic cleaning, despite overwhelming publicity, is not a magic method that obsoletes all other cleaning methods. Using it as the last stage in a well designed cleaning process gives best results. It is employed only as an additional process to remove traces of objectionable dirt remaining after cleaning by another method.

Subzero chilling is proving to be a useful industrial tool for:

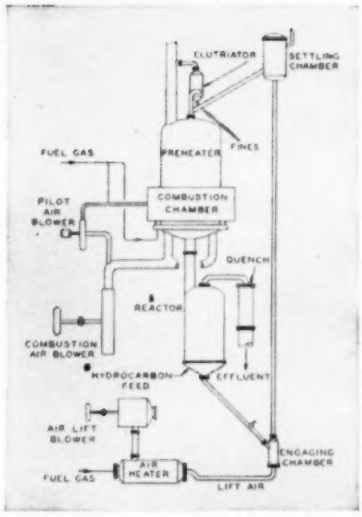
1. Complete transformation of austenite to martensite, giving stability to precision parts and increased hardness and ductility to perishable tools.

2. Normalizing and stress relieving of ferrous and nonferrous castings.

3. Shrinkage of metals for expansion fitting and assembling.

4. Testing of instruments and other products that must perform satisfactorily in extremely cold temperatures.

Cold pressure welding, developed in England a few years ago (McG-H Digest, Apr '50, p33), has spread into a number of industries, primarily for welding wrought nonferrous metals. Uses include: lapwelding of foil and shielding tapes in cable manufacture, electric contacts to contact arms, germanium diode cases; butt welding of copper terminal ends to aluminum transformer coil, aluminum and copper coil ends in transformer manufacture, enameled-covered wires, lead solder wire.



PEBBLE HEATER, also used for superheating gases, gives . . .

More Petrochemicals From Thermal Cracking

The pebble heater has been developed by Phillips Petroleum Co. for light-hydrocarbon cracking and high-temperature superheating. Its higher temperatures, short contact times, and lower pressures than in tube cracking furnaces give higher yields of ethylene and acetylene.

Ethylene yield, while cracking n-butane, is 50% greater than in tube furnaces. Cracking an ethane-rich feed gives a yield of ethylene and acetylene 25% greater than in tube furnaces. Superheating temperatures as high as 2500° F. are practical.

The pebble bed extends from the top of the preheater, through throat and reactor, down to the engaging chamber of the pneumatic lift. Pebbles in the entire bed move downward slowly, are lifted by air to the settling chamber, and so return to the preheater. —Oil & Gas J, May 10, p162

Lead-Tin Coated Steel

Strip steel, precoated with a lead-tin alloy, offers important fabricating advantages. The coating also is substantially free from any undesirable film, roughness, or porosity.

Coated strip has excellent soldering properties and shows no change after many months in storage. No acid need be used. The coating affords also a good base for paints and synthetic enamels. Its effectiveness as a lubricant suggests its usefulness for drawing operation.

The coating was developed by Pittsburgh Steel Co. It is applied to cold-rolled steel strip electrolytically from a fluoborate solution. Alloy composition is 85% lead and 15% tin.—Iron Age, Mar 18, p140

New British Industrial Control Mechanisms

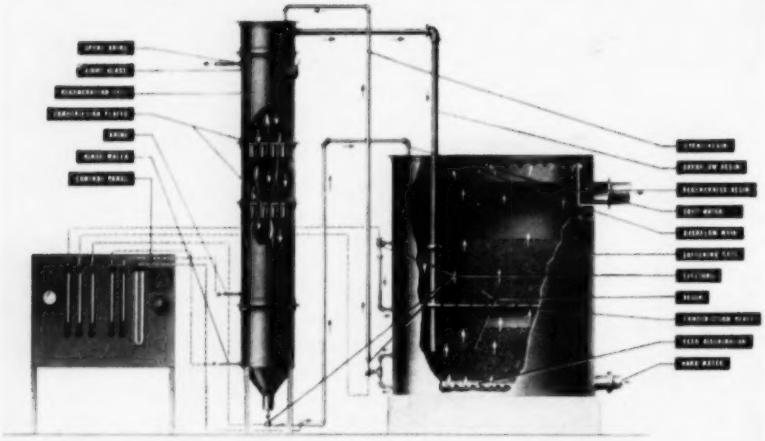
Here are some new British industrial control mechanisms that have recently been put to work:

• **Elongation Gage**—This measures the elongation of steel or other ferrous strip when rolled. Before rolling, a magnetic pattern is printed on the strip. During rolling, its peaks become separated and their wave length increases. The time interval between peaks before and after rolling measures the elongation.

• **Platform Leveler**—Tilting of a platform is automatically controlled by a device consisting of a light source and a photo-electric cell, with the bubble of a spirit level between them. Between the bubble and the cell is a narrowly slotted vane. When the platform is tilted, the bubble moves, causing the focus of the light rays to move away from the slot, and thus decreasing the light falling on the cell. The cell's output is compared with that from a twin cell in the direct beam of the light. The resulting signal difference provides a correcting force to restore the platform to a level position.

• **Accelerometer**—In this device, the balance of the moving system used in electrical indicating instruments is deliberately upset by attaching a small weight to the coil. When the device is subjected to an accelerating force in the right direction, inertia of the moving-coil system causes the coil to rotate in the permanent-magnet field system. Thus a small electric current is generated. This can be shown on a galvanometer or amplified for transmission to a distant point.—Electronics, May, p216

Look what's happened to Ion-Exchange



Illustrative drawing of the Dorrco Hydro-Softener. Note that regeneration is carried out in a separate tank from the softening cell to minimize danger of contaminating treated water.

It's Gone Continuous!

Infant prodigy of the Process Industries, ion-exchange has often been a problem child as well. Batch operation has been one of its major limitations in today's age of continuous processing.

Now, for the first time, the base or cation exchange cycle has been put on a completely continuous basis through the Dorrco Hydro-Softener. Originally developed for softening municipal and industrial water supplies, the Hydro-Softener has definite operational and economic advantages over conventional batch systems. And the basic principles show promise in many other fields as well.

Whenever a process involves the use of ion-exchange, the separation of finely divided solids in suspension, or fluidizing techniques, Dorr and its Associated Companies throughout the world can provide the correct equipment for the job.

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Chemical Progress

The fast-growing chemical industry is reshaping the American daily life and industrial economy

THE U. S. CHEMICAL INDUSTRY as a whole has made spectacular advances in growth and technical developments. These seven are outstanding:

1. Synthetic Fibers—Rayon became a commercial product only a generation ago. Other synthetic fibers have followed. Rayon production is now 1,600-million lb. a year, and the newer fibers 400-million lb. (over 4% of total textile-fiber consumption).

2. Plastics and Resins — Total output 30 years ago was 6-million lb. per year. Today it is 3-billion lb.—500 times as much.

3. Rubber—A production miracle of the last war was the billion-dollar synthetic-rubber industry. Notable advances include special-purpose rubbers, improved carbon blacks, new and better compounding agents, synthetic-fiber tire cords.

4. Agricultural Chemicals — In 20 years, farm population has declined 9½%, but agricultural output has risen 45%. Reasons: better chemicals and mechanization. In 15 years, fertilizer use tripled (to 25-million tons); use of other agricultural chemicals jumped tenfold.

5. Detergents—In 20 years, synthetic detergents have caught up with and passed soap in tonnage production. During the '40s, detergent output climbed 41.4% a year.

6. Metals—New metal developments have met modern industrial needs, as for jet engines. Titanium was still a rare curiosity in 1948. In 1949, output was 25 tons; last year it was 2,400 tons; goal in 1956 is 35,000 tons.

7. Medicines — Since 1900, an extra 20 years have been added to the average American life span. The chemical industry must be given a lot of credit—for the development and mass production of antibiotics, sulfa drugs, and many other medicines.—Chem Wk, May 15, p41

TECHNICAL SHORTS

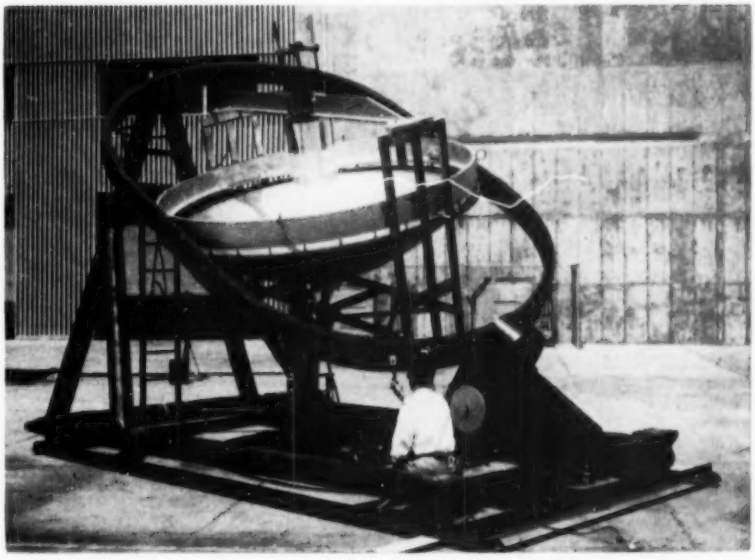
Infared Dries Molds—Sand-mold halves, 27x27x5½ in., are skin-dried to ½-in. depth at J. Stone & Co., Ltd., England, in 15 min. by infrared heat. Sheathed wire elements in troughs with alumium reflector surfaces are positioned over roller conveyors. Each unit is rated at 9 kw.—Mach, Apr 17, p669

Silicone-treated Papers — Kraft and glassine types of papers are being treated with a silicone to make them water repellent and able to withstand temperatures above 400°F. Use is as release papers for sticky products in rubber, steel and food industries.—Paper Ind, Apr, p57

Automobile Safety Tests—Battering rams made of heavy iron blocks are being used by Ford Motor Co. to simulate highway collisions at various speeds. The rams, used to study car safety, are fastened to ceiling beams and swing like huge pendulums into test cars. Manikins the size and weight of an average man are put inside car to determine passenger contact with interior parts.—Auto Ind, May 1, p39

Moly for Farms—Climax Molybdenum Co. is pushing use of molybdenum as a vital micronutrient in fertilizers. Farmers in Australia and New Zealand have restored fertility to barren country by adding as little as 2½ oz. of sodium molybdate per acre. It's also used in the U. S. on Florida citrus crops.—Chem Wk, May 15, p66

Cotton-nylon Blends — Nylon blended with cotton improves abrasion resistance 100% over an all-cotton fabric at about a 26% content of nylon. But cotton-nylon blended yarn has 10 to 20% less strength than all-cotton yarn. Only 5% of loss in fiber strength carries over into fabric strength in plain-woven fabric.—Textile World, May, p100



Solar Furnace Gives 8500°F. Temperature

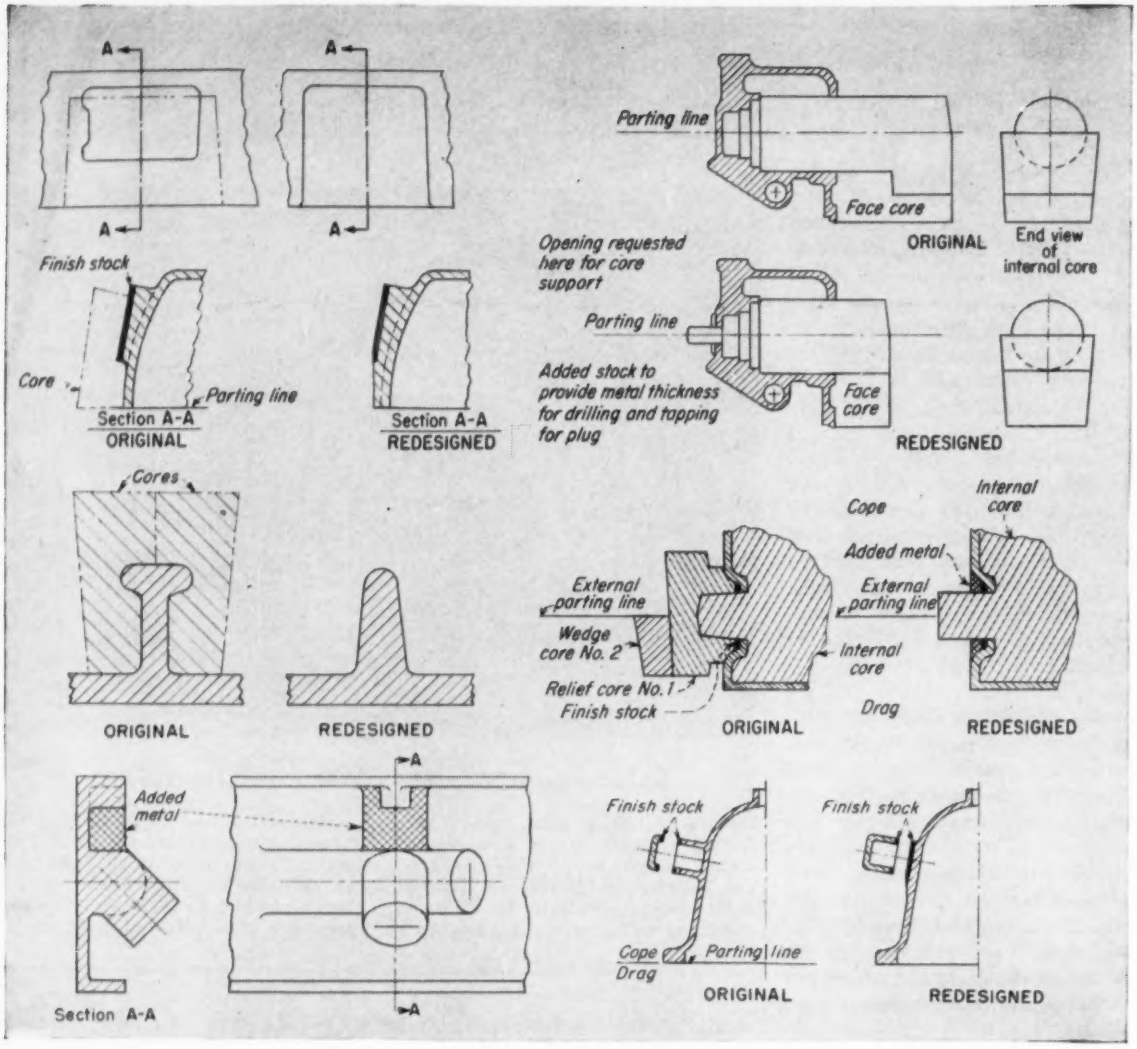
Intense heat from solar furnace aids testing of materials at Consolidated Vultee Aircraft Corp. It was designed and built by Dr. Willi Conn of Rockhurst College. Material to be tested (metal or refractory) is enclosed in a quartz envelope and placed within 120-in. mirror's focal point. Even the toughest refractories break down under the 8500°F temperature—three-quarters as high as the sun's temperature.—Am Mach, May 10, p192

Sulfite Pulp—By fall, a Swedish firm, Stora Kopparbergs Bergslags AB in Skutskaer, expects to make sulfite pulp from pine instead of fir. The process is believed to be based on removal of resins from the pine. It should strengthen Sweden's position in the world paper market.—Chem Eng, May, p108

Standard Telephone Turret—The first standard telephone turret unit in the U.S. is a feature of Portland General Electric Co.'s new load-dispatching room. It enables the load dispatcher to communicate by voice with any station throughout the PGE system. Two 20-line units make up the standard turret unit, developed by American Telephone & Telegraph Co. and Bell Telephone Laboratories. Previously such units were all custom made.—Elec World, May 3, p114

Ice-filled Drill—Freezing water inside a perforated drill point for chemical injections stopped sand infiltration encountered by Soil Testing Services, Inc. The injection section of drill rod was placed inside a pipe casing and surrounded by crushed dry ice. Water was introduced into the hollow drill and allowed to freeze. The drill was then driven to desired depth. Warm water thawed the ice. Chemical injection began with no danger of sand infiltration. —Const Meth & Equip, May, p16

Cutting Oily Steel Plates—Sometimes the flame from the torch ignites the oil deposits. Ansul Chemical Co. suggests this trick: spread a thing layer of dry fire-extinguishing chemical over the area to be cut. It will smother flames before the oil catches fire.—Factory, May, p300



You Can Cut Foundry Costs . . .

. . . and also raise production rates and enhance casting quality by improving product design. Your patternmaker can help with good suggestions

DESIGN OF NEW CASTINGS or redesign of old ones to cut production costs should be done with these basic, but most important, rules in mind:

- Avoid core designs that make foundry production difficult. Eliminate cores, whenever possible, by a substitute design of the product.
- Provide two-seat positions for large cores to avoid balancing problems.
- Consider using two castings of simplified design in place of one casting of more complex design.
- Simplify rib design.
- Eliminate, whenever possible, loose draw-back pieces that are used to prevent "tearing" of the sand when drawing the pattern from a mold. This construction is expensive. Eliminate also, by design, the need for separate set-in cores.
- Consider casting feeding, especially of thin-wall castings, to avoid rejects from metal shrinkage.

These rules are so basic that they sound simple. Let's see how they work, in relation to the examples illustrated.

Pad Design—Separate cores needed to mold the original pad design (upper left—on illustration) increased foundry costs. Redesigning the pad contour elimi-

nated cores and produced a cleaner, sounder casting. The amount of metal added is insignificant, even if weight reduction is the objective—as in magnesium castings.

Core Support—Core-balancing problems always prove troublesome in foundry practice. The original design (upper right) required an extra-large core print to balance the core. Even then, the core was not held properly. Redesigning the casting to provide a ¾-in. hole in the end permitted seating the core in a positive position. Core-print size could be reduced and the core still held firmly.

Simplified Ribs—Keeping rib design simple lowers casting cost. The original T-shaped rib (center left) required pasted ram-up cores. The redesigned heavier plain rib eliminated coring and cleaning—both expensive operations. At the same time, the redesigned rib was just as effective.

Core Design—Lower pattern and casting costs often have to be weighed against higher machining costs. The original design (center right) needed, besides the internal core, (1) a relief core and (2) a wedge core. Cores had to seat properly, but sand between the cores often resulted in improper seating. The solution: extra finish stock to eliminate two cores. Another advantage is a more positive seat for the internal core. Also, the internal core can be set quickly and easily into position in the mold.

Feeding—Thin-wall castings often present feeding problems. So extra stock was added (lower left) to help cast a heavy metal pipe line against the thin metal wall. Without the added metal, there was no adequate way to feed molten metal and prevent shrinkage in a critical area.

Separate Castings—Redesign of the bell housing (lower right) simplified a difficult casting job. The original casting required special cores to prevent damage to the sand mold during pattern drawing. Now the chamber and cover are cast separately from the bell housing. The casting operation is much simpler and production cost is lower.—Iron Age, Apr 15, p128

Transistor Use Widens to Variety of Products

Transistors have invaded the field of vacuum tubes—so much so that they will soon show an impression on the $5-billion electronic market. That is the feeling at Raytheon Mfg. Co. Its officials point out that Raytheon transistors are now used in these commercial products:

1. **Low-noise,** high-intelligibity microphone—to replace carbon microphones in aircraft, mobile intercommunication, and radio systems.

2. **Portable** audio frequency oscillator for testing telephone, broadcasting and similar equipment.

3. **Small oscillator,** crystal controlled, for use as secondary frequency standard. Self-contained batteries will operate the oscillator continuously for 2 years.

4. **High-voltage supply** powered by a flashlight battery and contained in a 2¾ x 1¾ x 1¾-in. case. Use: to operate portable radioactivity-measuring instruments and similar devices. It converts voltage from a couple of flashlight batteries to as much as 2,000 volts.

5. **Transistor preamplifier** and magnetic amplifier—to control motors and other industrial equipment rated up to 500 watts.

6. **Sound pickup** for film-projector amplifier.—Prod Eng, May, p201

Plywood Saves Time

Several West Virginia coal producers are building temporary stoppings out of plywoods. Ease of handling and more effective transmission of ventilating currents make plywood desirable.

Temporary plywood stopping, at Red Jacket Coal Corp., requires only half the time it formerly took to build a stopping of boards. The boards had to be made airtight with battens and wood-fiber plaster. Plywood stoppings are made airtight with only a small quantity of plaster at the top, bottom and joints.

The plywood sheets are nailed to posts set on 6- or 8-ft. centers. Sheets can easily be reclaimed with practically no waste.—Coal Age, April, p112

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Deeper cuts...
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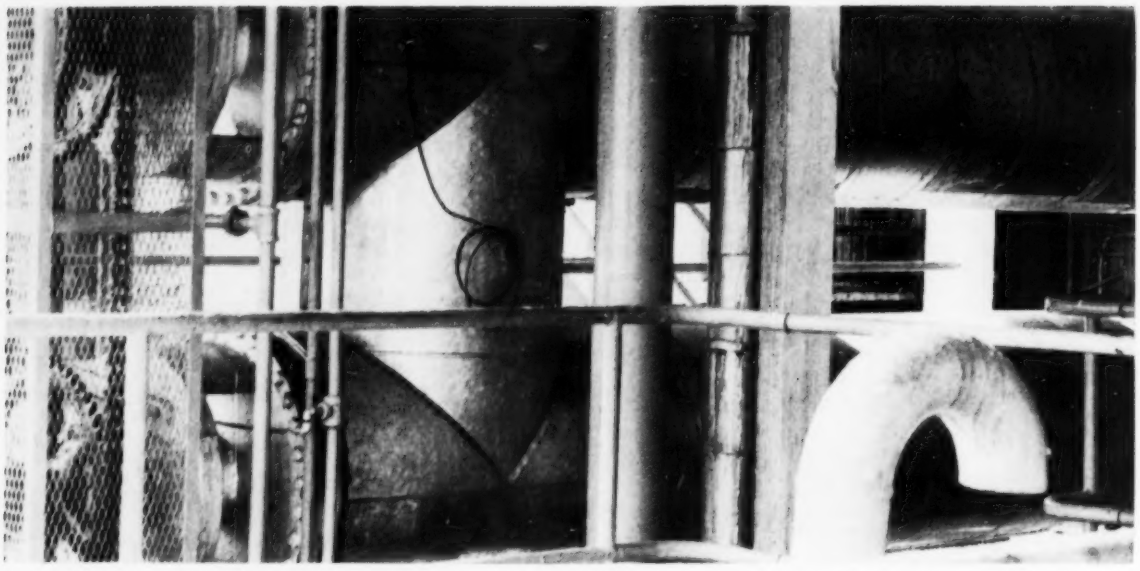
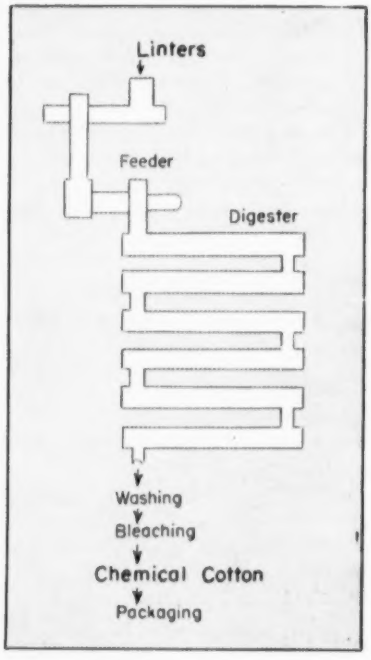


PRESSURIZED DIGESTER keeps cooking time short with higher pressures, less liquor, no stoppages in . . .

Continuous Cellulose Process

Continuous processing, as a rule, saves time and money over batch processing. It does it again in making of chemical-grade cotton from linters



NOW REVEALED is that a continuous process for producing chemical-grade cotton from linters has been in operation for 5 years. Hercules Powder Co. developed the process and is operating it at its Hopewell, Va., plant.

A continuous digester is heart of the process. It digests moist cotton fibers, rather than fibers slurried in liquor.

Advantages of the process include:

• **Low operating cost.** Less cooking chemicals, steam, labor, and maintenance are needed than for batch operation.

• **Space saving.** Continuous operation needs only 1½ hr. of in-process time, compared with 18 hr. for the same-size (300 ton per day) batch operation. This means smaller inventory, compact equipment, and minimum housing space.

• **Less stream pollution.** Waste black liquor has a high solids content and may be economically concentrated for burning or recovery.

• **Flexibility.** The continuous process maintains the flexibility of the batch method. Operating conditions can be readily changed to produce the different grades of chemical cellulose needed for manufacture of viscose, cupra-ammonium rayon, cellulose acetate and nitrate, ethyl cellulose, fine paper, filter paper, and plastic-impregnated paper.

Here's how the process works. Raw cotton linters are cleaned of seed hulls, bolls, and cotton stalks. They are weighed automatically, pneumatically conveyed to a wetting-out cell, and mixed with the cooking liquor containing caustic soda and detergents.

Wet linters then drop into a feeder that forces them, by a revolving screw, through a cylindrical jacket to squeeze out excess liquor. Linters pass into the forming tube leading through the side of the digester.

Directly opposite the tube is mounted an air-loaded piston in contact with the outlet of the tube.

As linters are forced ahead by screw pressure, the piston is pushed back and a substantial portion of linters drop into the digester. Thus there is a continuous feed to the digester. If linters cease to flow, the piston reseats against the end of the tube.

Steam and more cooking liquor also are injected into this part of the digester. Linters are handled as a fibrous mass through the digester, so they act as a matrix to carry the liquor. As the liquor's role is to add chemicals to the fibers, no large bulk of it is needed as in batch processing.

The liquor can be made strong to reduce cooking time. And as there is less liquor than in a slurry, less steam is needed, despite the higher pressure. Linters, after feeding, enter the first of eight horizontal, interconnected chambers, mounted one over the other. Revolving screws move the material through the chambers. Cooked linters leave the digester through a tube similar to the one at the feed end; pressure blows the fibrous mass into a repulp tank.

Slurried fibers are then bleached, first by a cold acid-chlorine bleach in an upflow tower and next by a high-density alkaline-hypochlorite bleach in a downflow tower. Fibers are washed between stages in horizontal vacuum filters. In the bleaching process, chlorination can be inhibited as desired to help control product viscosity.

The final product is dried either in sheet form or as a loose mass. It is then baled and wrapped automatically.—Chem Eng, May, p116

Pumps' Waste To Ground

A well casing, 1,600 ft. deep, is the outlet for process waste water at the Chloromycetin plant of Parke, Davis & Co. The plant uses a vast quantity of water. Some of it comes out of the process unfit for ordinary sewer disposal.

Waste water from the process flows through a gravity sand filter. From there it goes into two large wooden collecting tanks. A porcelain-lined duplex piston pump finally pushes the waste at 90 lb. per sq. in. into the ground.—Factory, May, p140

Waxed Papers Developed to Fill Various Needs

About 500,000 tons of waxed paper are being used every year in the U.S. Output is expanding as new papers are developed. The following are new products or papers that have undergone successful trial runs by Mid-West Wax Paper Co.

1. **Antifungus papers,** oiled and waxed, for packaging materials of high moisture content.
2. **Pyrenone-treated** papers for car liners; claimed to give a 98% kill of grain bettles in 24 hr.
3. **Package over-wraps** waxed with high-gloss polyethylene wax mixtures; suitable for wrapping crackers, cookies, similar products.
4. **Polyethylene-wax** locker papers waxed with improved poly-wax-resin blends. Wrap has high resistance to water and vapor.
5. **Laminated** locker paper made by combining 25-lb. paper with 30-lb. paper using 25 lb. of microwax blend.
6. **Baking paper** for cake ovens. Kraft paper is treated with mineral oil of low evaporation rate and good heat resistance.
7. **High-gloss,** heat-seal bread wrap. Improved moisture retention is gained by use of resin additives.
8. **Corrosion-resistant** metal wraps made by saturating a natural creped paper with an undyed pliable wax blend.
9. **Anticorrosive** wrap made by laminating papers treated with volatile corrosion inhibitors,
10. **Wet- and dry-waxed** metal innerleaver papers for the metal industry.—Paper Ind, Apr, p51

International Business Briefs

London—A $13-million contract to supply diesel locomotives to the Irish State Railways—largest diesel locomotive order ever placed in Britain—was received by Metropolitan-Vickers Electrical Co.

Mexico City—SNIA Viscosa Co. of Milan is supplying 25% of the investment (in the form of machinery and technical aid) in a new $17-million cellulose plant being built at Ciudad Anahuac.

New York—In an unusual American-Swiss deal, Sprout, Waldron Co., of Muncy, Pa., will sell in the U.S. basic flour milling equipment built by Buhler Bros., of Switzerland; latter will build and sell feed milling units from Sprout, Waldron designs.

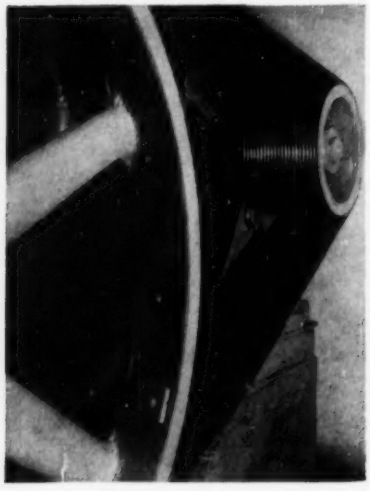
Johannesburg — Canadian (Overseas) Asbestos Corp. has bought an asbestos mine in Belingwe, Southern Rhodesia, and will spend $3-million developing its output to 15,000 tons of fiber annually—for export to India.

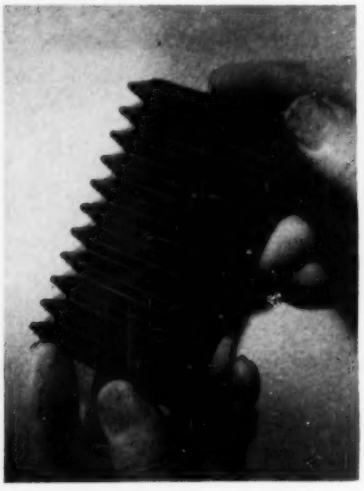
Istanbul—Ten foreign firms, including British, Danish, Swedish, American and Dutch enterprises, have started industries in Turkey under the new Law for the Encouragement of Foreign Capital; about twenty more foreign projects have been approved.

New York—Watson-Stillman Co. (division of H. K. Porter Co. and makers of hydraulic machinery for plastics, metalworking, extrusion and railroad industries) has established a wholly owned sales subsidiary in Holland. It will market Watson-Stillman equipment manufactured by N. V. Machinefabriek "Breda."

Lima—A new $3-million tire and rubber company has been formed in Peru to manufacture goods under license from B. F. Goodrich Co., U.S.

NEW PRODUCTS





New Belt Drive Provides More Power, Needs Less Space and Has Longer Life

Called Poly-V, it is like no other belt drive. It is a flat belt with a ribbed traction surface along its length. This construction combines the simplicity and strength of flat belts with a high V-groove grip. And it will increase drive capacity 30 to 50% for the same width of a multiple V-belt drive. It will also:

• **Eliminate** the matching problem of ordinary V-belts. The Poly-V belt is a single unit across the full width of sheaves, not an assembly of several V-belts that vary in exact length because of manufacturing tolerances and material limitations.

• **Cut down** on belt and sheave inventories. Only two cross-sections of Poly-V belts are required for all drive requirements from 3-in. pitch diameter sheaves and 50-in. belt pitch upward.

• **Save space.** Narrower sheaves deliver more power in less space. In most applications, the width of the Poly-V drive is about two-thirds to three-quarters the width of standard multiple V-belt drives of similar horsepower.

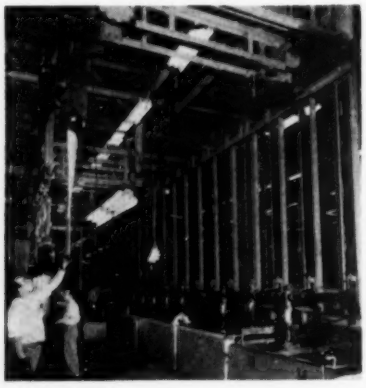
• **Give high strength** and flexibility. Belt has an uninterrupted strength member across its width, giving twice the traction area of a multiple V-belt drive of the same width. Poly-V gives V-groove grip with half the face pressure. This cuts belt wear.

• **Maintain** constant speed ratio. The rubber ribs of Poly-V completely fill the sheave grooves. No amount of tension can pull the belt down into the grooves further. This eliminates worn shoulders and rings in sheave grooves as well.—**Raybestos-Manhattan, Inc., 500 Fifth Ave., New York 36, N. Y.**

New Bench Grinder

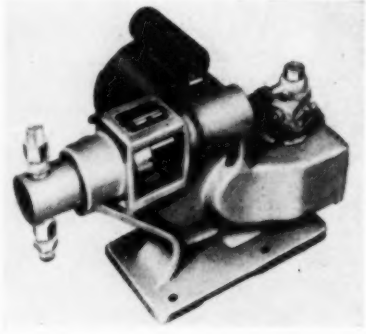
Called the 6-in. Standard Ball Bearing Bench Grinder, new shop tool is designed for intermittent shop use in grinding, tool sharpening, wire brushing, and buffing.

Tool weighs 25 lb., is 9 in. high, and has an over-all spindle length of 12 in. Wheel size is 6 in. in dia. with a $\frac{3}{8}$-in. face and $\frac{1}{2}$-in. hole. The unit's motor is designed to operate on standard a-c. single-phase voltages.—**Black & Decker Mfg. Co., Towson 4, Md.**



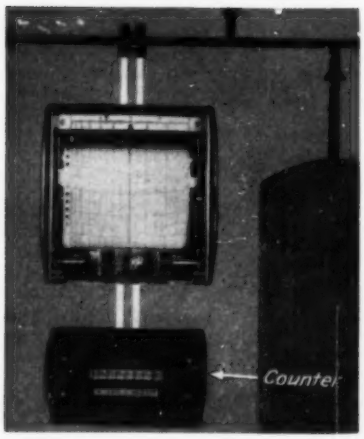
Transfer Plating Conveyor

Elevator-type plating conveyor, shown here zinc-plating steel propeller blades, recycles the work. The blades are automatically transferred from and then back to the plating conveyor. A mechanical counter located on top the blade-holding fixture determines the number of recycles, according to its presetting. The conveyor is hydraulically operated.—**Hanson-Van Winkle-Munning Co., Matawan, N. J.**



Proportioning Pump

Pump model 11-5-S is available in 10- or 20-gal.-per-hr. capacities, open or explosion-proof motor drives in a variety of voltages, and steel or stainless-steel measuring-cylinder assemblies. It has a self-aligning connecting rod and a one-piece bar stock cylinder.—**Proportioneers, Inc., Providence, R. I.**

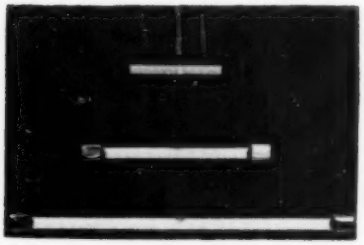


Flow Integrator

Receiver-integrator, Type 224, for graphic panels computes an accurate and continuous total of any process flow and operates a small counter. In operation, pneumatic measurement signals (3 to 15 lb. per sq. in.) are transmitted from the process to the receiver.

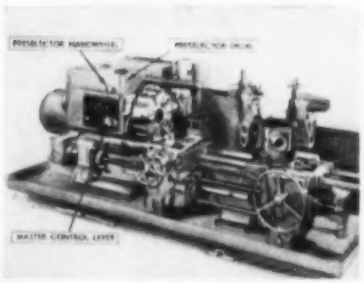
In the receiver, a bellows positions a cam-switch mechanism. The switch produces an electric impulse in precise and constant relation to flow measurement.—**Foxboro Co., Foxboro, Mass.**

speeds up to 20 mi. per hr. Turning radius of the combination is a minimum 13 ft. 5 in. with the body up. This feature makes maneuvering in close quarters and safe dumping over steep fills easy.—**Athey Products Corp., 5631 West 65th St., Chicago, Ill.**



Infrared Lamp

A revolutionary type of infrared lamp has scores of electrical heating applications, including drying, baking, and cooking. Lamp is only slightly larger in diameter than a cigarette. The tube is made of fused translucent quartz and has a coiled tungsten filament operating at about 4,000°F. Lamp comes in 500- and 1,000-w. sizes for use on circuit voltages of 115-125 and 230-250 respectively. Rated life is more than 5,000 hr.—**International General Electric Co., 570 Lexington Ave., New York 22, N. Y.**



Heavy-Duty Turret Lathe

Saddle-type model 3A turret lathe features (1) greater power to give users full advantages of improvements in tooling and cutters; (2) more speeds with smaller increments; (3) automatic gear shifting to reduce handling time and operator fatigue.

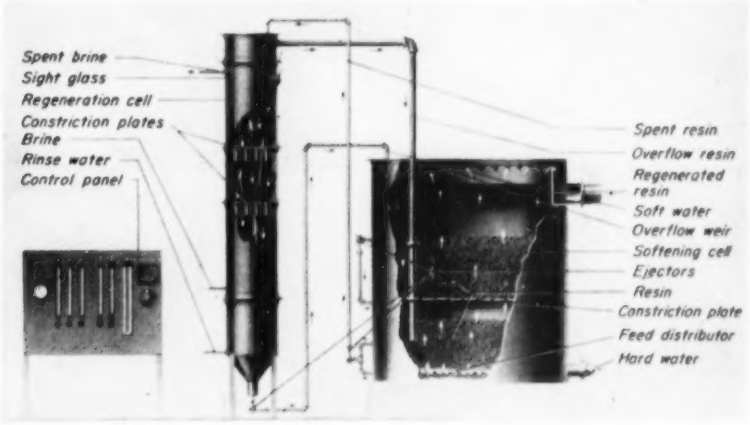
The machine is available with 4½- or 6-in. dia. capacity. Swing is 23½ in. Sixteen speeds (or 32 with two-speed motor) can be preselected. Four hydraulic cylinders in the headstock shift gears automatically as preselected by the operator.

Other features: rapid traverse on cross-slide and hexagon turret, spindle inching, automatic lubrication of the unit's gearbox bearings.—**Warner & Swasey Co., 5700 Carnegie Ave., Cleveland, Ohio.**

Hauls Big Payload

New 27-yd. earthmoving trailer is designed primarily for rock hauling. Hopper is all-welded and frameless. Body has a 14 x 10-ft. top opening, to make it an easy target for shovels, draglines, or other overhead loaders. Trailer is of the rear-dump type.

A Caterpillar DW21 pneumatic-tired tractor hauls the trailer at



New Water Softener Ends Batch Operation

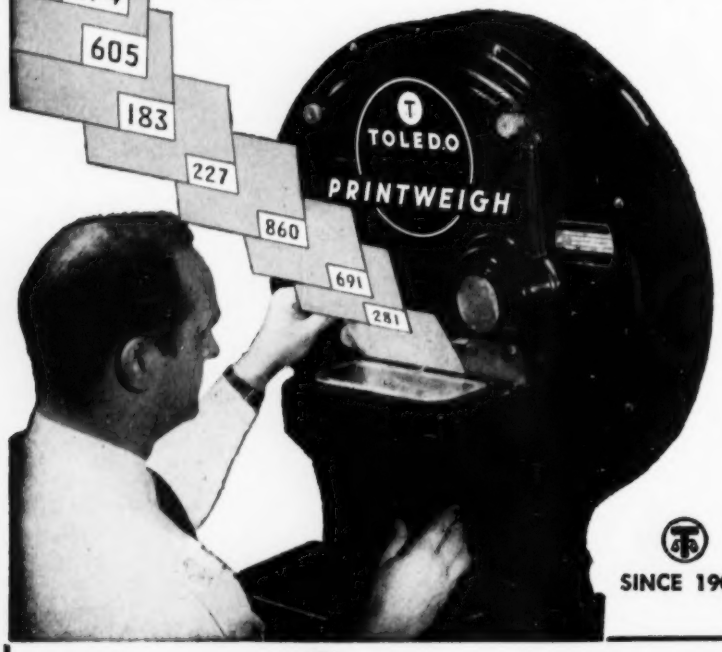
New Hydro-Softener provides continuous softening of process water containing 200 parts per million or less of total hardness. Softening to less than 5 ppm. is achieved by a base exchange resin, part of which is continually regenerated in a separate column to eliminate batch operation. Unit's chief advantage lies in its uninterrupted production of constant-quality water. Operating costs are reduced by smaller resin needs. A single unit treats between 75 and 800 gal. per min., depending on hardness of water and size of equipment.—The Dorr Co., Barry Place, Stamford, Conn.

PRINT THE WEIGHT

...stop costly human errors!

Use Toledo Printweigh Scales to stop human errors in reading, remembering and recording your weights . . . assuring that the accurate indication of the Toledo dial reaches your accounting records without human error. Control your costs with Printweigh in receiving, stockrooms, batching, shipping and other operations in all plants today. Wide selection of types and capacities. We will be glad to send details on Printweigh or other Toledo products . . . write for catalog T-10. Toledo Scale Co., Toledo 1, Ohio, U. S. A.

SALES AND SERVICE IN 50 COUNTRIES

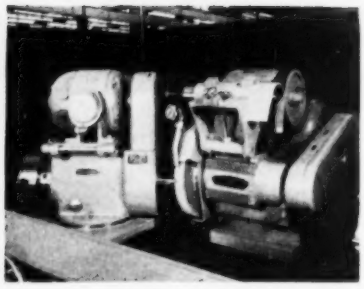


SINCE 1901

NEW! FAST! Toledo Speedweigh Scales with over-under zero indication are available in three sizes—5 lb., 20 lb., 50 lb. Wide angle reading; choice of platters and scoops. Write for bulletin 1416M.

TOLEDO®

HEADQUARTERS FOR SCALES



Swiveling-Head Grinder

Universal production grinding machine, the 12-in. model V-4, is versatile and quickly set up. Its swiveling headstock has a dog-drive plate on one end for conventional grinding and a 5-in. nose on the other end for mounting chucks or fixtures.

Setups can be changed quickly from dog-drive to chucking operations by rotating the headstock 180°. The headstock is a combination live-center and dead-center type. Lowering a hinged-bracket internal-grinding spindle allows a quick change to internal-grinding operations.

Other features: two swivel mountings for wheelhead, combination lever and handwheel-operated footstock, pressure-lubricated ways, accessible pumps and motors.—**Norton Behr-Manning Overseas Inc., Worcester 6, Mass.**

Portable Band Saw

Completely portable electric metal-cutting band saw weighs only 16 lb. Scarcely larger than a hand hack saw, it is 15 times faster. Stock-cutting capacity is 3¼ in. Unit is 19½ in. long. —Porter Cable Machine Co., Syracuse, N. Y.

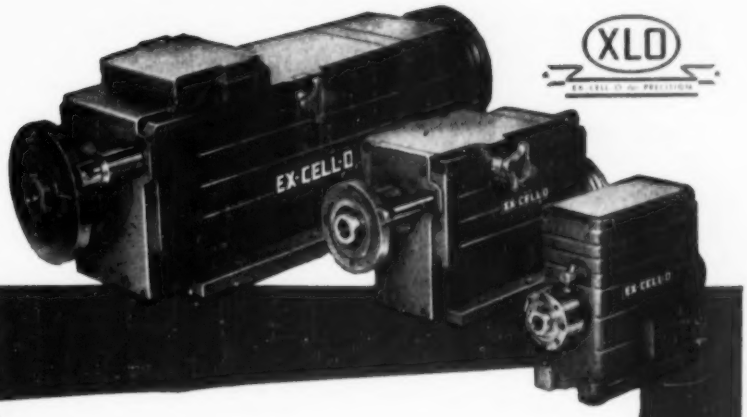
Air-Operated Pump

Compressed air-operated displacement pump works automatically when connected to any compressed-air supply line. Called the Ejectopump, it has no rotating or reciprocating parts. Pump works by means of a float and two return valves, which are in contact with the liquid, and a header housing pneumatic valves and an air-operated ejector.

Unit has many industrial applications but is particularly suitable for food products such as hot soup, fruit pulps and edible oils, as there is no churning action.—**Ferro Corp., 4150 56th St., Cleveland, Ohio.**

Magnetic Conveyor

Magnetic parts and scrap conveyor that inclines up to 72° operates with low-discharge presses where space or other problems rule out larger cleated press conveyors. — Rapids-Standard Co., Inc., 311 Rapistan Bldg., Grand Rapids 2, Mich.



Build High-Production Machines
WITH THESE

EX-CELL-O Quill-Type
HYDRAULIC POWER UNITS

Ex-Cell-O Power Units feed or rotate tools in easily controlled automatic cycles. A single tool can be held in the unit spindle or a multiple head can be bolted to the quill flange. The Units are used in low-cost, high-production machines for such operations as drilling, reaming, counterboring and spotfacing. A typical machine consists essentially of a plain base, a work-holding fixture and one or more power units.

Ex-Cell-O Units are self-contained and compact; can be mounted horizontally, vertically with the spindle nose down, or at any angle between these positions.

Ex-Cell-O styles 28-A, 21, and 20 Quill-Type Hydraulic Power Units are shown above. They are standard models. Send for *all* the facts about them. Write or cable Ex-Cell-O for Bulletin 45828.

53-34

EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN, U.S.A.
CABLE ADDRESS:
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PRECISION MACHINE TOOLS · CUTTING TOOLS · MACHINES TO PACKAGE MILK IN SANITARY PAPER CONTAINERS

specify **HONAN-CRANE**

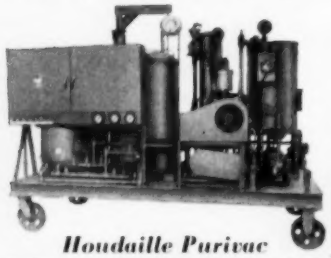
for DEPENDABLE, LOW COST filtration of

- HYDRAULIC OILS
- TURBINE OILS
- DIESEL FUEL & LUBE OILS
- METAL WORKING OILS & COOLANTS
- QUENCH OILS
- INSULATING OILS

Clean oils and coolants mean protection for your equipment against costly shut-downs and repairs often caused by abrasive and corrosive contamination. Increase machine production capacity and lower operating costs in your plant now with one or more Honan-Crane automatic filtration units.

WRITE FOR NEW BULLETIN describing Honan-Crane's complete line of oil filtering and handling equipment.

HONAN-CRANE CORPORATION
26 MADISON AVENUE, LEBANON, INDIANA, U. S. A.
a subsidiary of **HOUDAILLE-HERSHEY CORP.**

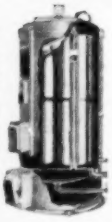


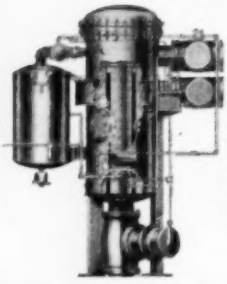
Houdaille Purivac

Purifies, dehydrates and degasifies insulating oil in one automatic operation. Operates in the field (while electrical equipment is in service) or at a central station. Eliminates transformer cleaning, reduces corrosion and deterioration of fabric insulation, restores dielectric strength of oil.

purifiers

Available in many types and sizes to provide needed range in capacity. Use bulk refill or handy, interchangeable cartridges. Remove all types of contamination including dirt, sludge, acids and products of oxidation.





clarifiers

Automatic or mechanical units meet all filtering requirements of small or large central coolant systems. Remove abrasives and other solids from oils and coolants used in grinders, broaches, boring machines, etc.

VICTOR MOLYFLEX

hack saw blades

Now high speed steel blades can be used for *all* metal cutting jobs. Victor "Molyflex" Blades are shatterproof, so flexible they cannot be broken in use in a frame. Yet they cut just as well, last just as long as high speed steel blades.

VICTOR SAW WORKS, INC.
MIDDLETOWN, N. Y., U. S. A.

MAKERS OF HAND AND POWER HACK SAW BLADES, FRAMES AND BAND SAW BLADES

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NEW PRODUCT BRIEFS

Adds, Subtracts Fractions — New office calculator adds and subtracts fractions directly—there's no need to convert to decimals. Machine accumulates fractions and automatically converts them to whole numbers, or whole numbers and fractions. — **National Cash Register Co., Dayton 9, Ohio.**

Atmosphere Tester—New portable visual unit determines quickly and easily the quality of gas being produced by a special atmosphere generator, also the quality of the atmosphere in special atmosphere heat processing furnaces. For example: when carburizing or doing other heat processing of high-carbon parts, the unit will determine the carbon potential of the atmosphere produced by the generator or present in the furnace.— **Electric Furnace Co., Salem, Ohio.**

Controls Pressures — Climax type 1440 nonrecording pressure controller handles both positive and negative pressures with high sensitivity. It is adaptable to control of vacuum relief, reduced pressure, fluid pressure, pump-discharge pressure, boiler-steam pressure. Range is vacuum to 10,000 lb. per sq. in.—**Black, Sivalls & Bryson, Inc., Kansas City, Mo.**

Fills Aerosol Cans—New aerosol-can filling machine handles the triple-phase problem. Special filling heads provide ±1-gm. filling accuracy. Capacity of 12-spout filler is 50 to 100 of 6½-oz. aerosols per minute on a pressure-fill line. Unit operates with all types of liquids and semi-liquids.—**MRM Co., Inc., 191 Berry St., Brooklyn, N. Y.**

Small Vibrating Conveyor—New and smaller vibrating conveyor features greater simplicity, reduced power requirements, and better efficiency. Spring-mounted unit is designed to convey coal and other materials at 38 ft. per min. Unit can be set up and moved in less than an hour. Only maintenance required is lubrication of three standard cartridge-type bearings. — **Hewitt-Robins, Inc., Stamford, Conn.**

MANAGEMENT REPORT

Managements of metal-fabrication firms had better take closer looks at their welding operations as competition increases. Its increasing use in the U. S. is witnessed by its rapid growth since the beginning of World War II. Since 1939, the welding sales index has climbed three times as fast as over-all industrial production.

As competition becomes more intense, automatic welding will gain momentum in replacing hand welding on many jobs. Look for new delevolpments in submerged-arc welding, increasing use of metal and tungsten inert-gas welding, and development of high-speed contact electrodes for manual arc welding.—Weld Eng, May, p43

Production executives must watch the cost factor closely in the design of automation equipment and processes. Requirements are: (1) no increase in material or part cost can be tolerated; (2) reduction in labor must not be offset by an increase in labor-rated overhead; (3) physical plant facilities must be reduced; (4) machinery must be standardized.

Sylvania Electric Products, Inc., based a new process development on these points. Transformer coils were made on a conventional winding machine. Now they are made by rolling wide sheets of metal foil and insulating paper together, then slicing the roll to form the key element of a transformer or the complete transformer.—Am Mach, May 10, p190

The days of the spellbinding salesman are over. That's what we hear from the men who know at Allis-Chalmers Mfg. Co. They hold that operating men are finding that they can trust the industrial salesmen who call, that a sales negotiation is a two-way affair, that the modern salesman knows he must earn his orders by serving the accounts.

How about your salesmen? Would they do a better job by following these simple rules: (1) inform themselves thoroughly before making any call, (2) bring literature and use it to support their claims, (3) leave literature that can be studied at leisure, (4) be a reliable source on application data, materials, and construction features of equipment. It's easy to spot the salesman that can help you; he's worth your time.

Banks throughout the U. S. are watching with interest a new free checking-account system set up for its employees by the First National Bank of Boston. It works likes this:

- The bank started each employee with 100 checks bearing his name. Monthly statements are mailed.
- Every payday, it deposits the employee's net earnings in his account.
- An employee can write as many checks as he wants. Or he can withdraw his whole pay.

Employees' first reactions were favorable. However it's realized that not all employees want their employers to be able to keep such a close watch on their affairs. And not all banks want their employees as clients.—Business Wk, Apr 24, p70

Time spent on jobs is recorded by an unusual method—in tenths of an hour—by workers at the Lenkurt Electrical Co., San Carlos, Calif. For instance, a worker who begins an assignment at 9:37 a. m. and finishes it at 11:04 a. m. marks his time card 9.7 and 11.1.

To facilitate use of the system, all clock faces are divided into tenths of hours. This is done by painting each alternate 6-min. segment a light gray. Each segment is numbered. Thus any worker can tell at a glance in which tenth of the hour he begins and finishes his work.—Electronics, May, p266

The hydrogen bomb has made practically all plant-protection measures meaningless. Crews trained in fire-fighting, personnel shelters, etc. will mean little if an H-bomb ever lands near a plant. So the best answer seems to be wide dispersal of plants.

Russia has already dispersed its plants widely, and latest news hints that China is doing so too. In the U. S., a trend toward moving to the suburbs has been going on for years; but the question now is whether the suburbs are far enough away.

How about your new plant (if you're building one), or your new expansion? Have you considered the dangers of an atomic war in your planning? These are questions every businessman must ask himself, whether he lives in Detroit or London, Sydney or Rio de Janeiro.

You can draw a parallel between the growth of aluminum and the growth of titanium. In its first 50 years, aluminum dropped in price from $18 per lb. to 24¢. Titanium has recently been cut to $4.72 per lb. And now a new titanium producer has entered the market. Shawinigan Water and Power Co., Canada, has a new process that, it says, "will make possible titanium on a commercial scale at prices substantially lower than have been possible heretofore."

Prices are coming down just as they did with aluminum. So now is the time to start planning on how you can make your product better or make better products with titanium.

anywhere there's industry

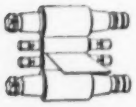
you'll find BLAW-KNOX

Throughout the world we have helped many companies improve production and profits through our (1) engineering know-how that includes an intimate understanding of world-wide industry . . . and (2) engineered products that are designed and built to meet individual customer requirements.

Here, for example, are some of the Blaw-Knox products that have contributed to world-wide industrial progress and development.

GENERAL INDUSTRY

ROLLING MILLS
Rolling mills and auxiliary machinery for rolling ferrous and non-ferrous metals to shape and specification.



ROLLS
Recent technological improvements combined with 80 years experience in roll making assure quality rolls—for ferrous and non-ferrous mills.

CHEMICAL PLANTS
Engineers and constructors of chemical, petrochemical, petroleum and atomic energy plants.

PROCESS EQUIPMENT
Engineering and manufacturing facilities for fabrication of standard equipment or development of units to customer specifications for the chemical, food and dairy industries.

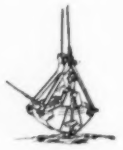
STEEL GRATING
Safe footing provided by rigid one-piece ELECTROFORGED® construction and non-slip twisted crossbars—for floors, platforms, walkways, stair treads and many other uses, both indoors and outdoors.

POWER PIPING
Complete prefabricated power piping systems for all pressures and temperatures plus a complete line of pipe hangers and vibration eliminators.

CONSTRUCTION INDUSTRY

BATCHING PLANTS
Bins, batching plants, truck mixer loading plants, and central mixing plants for concrete construction are offered in many sizes and variations for both fixed and portable installations.

CLAMSHELL BUCKETS
Wide range of types and sizes for every kind of digging and rehandling. Built to withstand the severest working conditions.



SUBGRADER, SPREADER, FINISHER
These three machines work as a team—giving final preparation to the road bed, spreading the concrete evenly and finishing the surface—on concrete roads and airports.

TRUKMIXERS
Excel in high yardage production and trouble-free performance. Revolving hopper eliminates many costly delays often caused by wear, leakage and seal failures.

ADNUN BLACK TOP PAVER
Accurately lays hot or cold asphaltic mixes, sand, cinder, slag, soil cement, chips and stone—for bituminous roads and airports.

MULTI-FOOTE CONCRETE ROAD PAVER
Anyone who drives a truck can handle these big, fast mixers. Large 34 E Duomix double-drum model delivers 34 cu. ft. of mix every 35 seconds. 27 E and 34 E Single Mix have same strong, simple construction.

For further information on Blaw-Knox products and services, just write or wire our Export Department.

BLAW-KNOX COMPANY PITTSBURGH, PENNSYLVANIA, U.S.A.

Address—Export Department
Chrysler Building, 405 Lexington Avenue, New York 17, N.Y.
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Unusual Turbocharger Has Monorotor Design

New turbocharger for diesel engines has an unusual arrangement: the compressor impeller and turbine wheel are back-to-back, forming a single rotor structure.

The turbocharger, built by De Laval Steam Turbine Co., Trenton, N. J., raises engine outputs to 190 lb. per sq. in. and higher—about 2½ times that possible from unsupercharged engines. The Monorotor design reduces windage, leakage and friction losses substantially. The reduction is an important factor in the high combined efficiencies obtained—up to 68%.

Compressor and turbine blades are arranged on opposite sides of the rotor hub. The rotor is overhung and secured to the end of the shaft with a tie bolt. The design reduces the number of air and gas seals and partition walls normally required. It also allows simple cooling of the turbine by direct transfer of cooling air from the compressor side to the turbine side.

The unit can deliver air up to a capacity of 10,000 cu. ft. per min. for combustion and scavenging. It is built for pressure ratios as high as three to one.—Prod Eng. Apr, p150

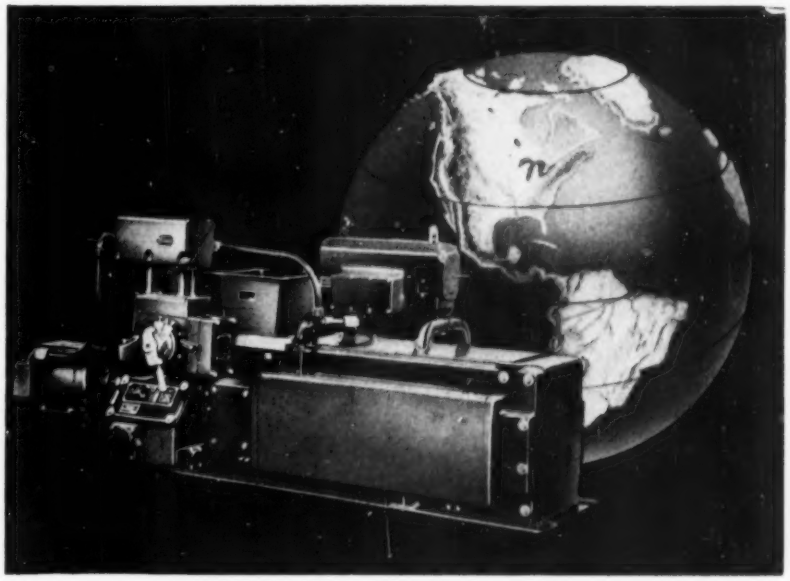
Metalworking Shorts

▶**Piston rings** will be made of powdered metal at Thompson Product Co. They will be made of iron and graphite but will have a greater graphite content than cast-iron rings—20% compared to 3%. —p81

▶**New forging machine** is claimed to be the world's largest horizontal-type machine. Made by National Machinery Co., the machine weighs 968,436 lb. and is nearly 15 ft. long, 12 ft. wide, and 12 ft. high.—p142

▶**Coolant bacteria,** long bothersome in machine shops, are killed by a European-developed process. The Hyla process sterilizes water for coolant mixtures by running the water through a unit containing silver salts.—Am Mach, Mar 29, p145

carries weight the world over



The Merchen way of feeding dry materials in modern processing operations — milling, pre-mixing and continuous blending—has won international approval in many hundreds of installations.

Weighing and feeding in one operation, W&T Merchen scale Feeders deliver the continued minute-to-minute accuracy and dependable performance which help ensure a final product of uniformly high quality.

In addition, by saving time and labor and by minimizing shutdowns, the W&T Merchen Scale Feeder contributes to substantially reduced operating costs.

Accuracy, dependability and economy — these unseen but inherent values are a few reasons W&T Merchen Scale Feeders are a familiar sight in processing installations all over the world.

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Ammonia Control Apparatus—Cathodic Protection Systems—Chlorinators—Chemical Feeders—Decay Control Processes for Produce—Electric Marine Beacons—Flour Processing Chemicals—Magnetic Separators—Pharmaceuticals—Precision Instruments—Sifters.

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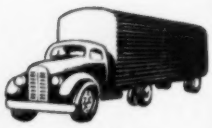

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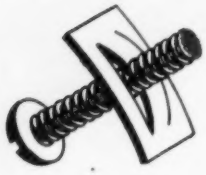
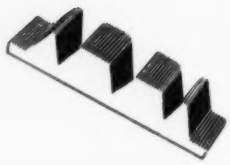


FASTENING

FINISHES



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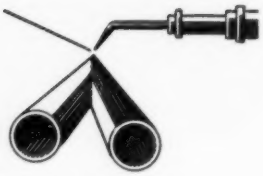

WELDING

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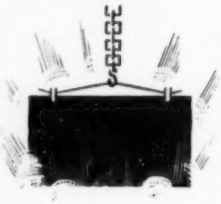
MACHINING

HEAT TREATMENT



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HERE'S WHY: If you are a manufacturer, fabricator or processor, you will know that Reynolds Lifetime Aluminum is *the* modern material for product design and improvement. It is light in weight, strong, rust-proof and corrosion-resistant, easy to handle, attractive and needs no maintenance. It has improved thousands of products and processes in virtually every industry.

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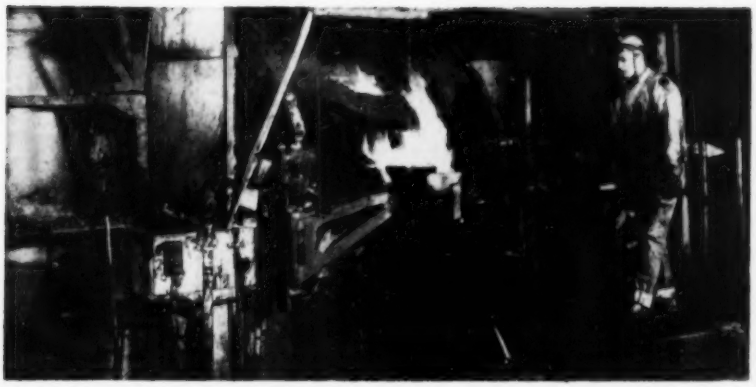
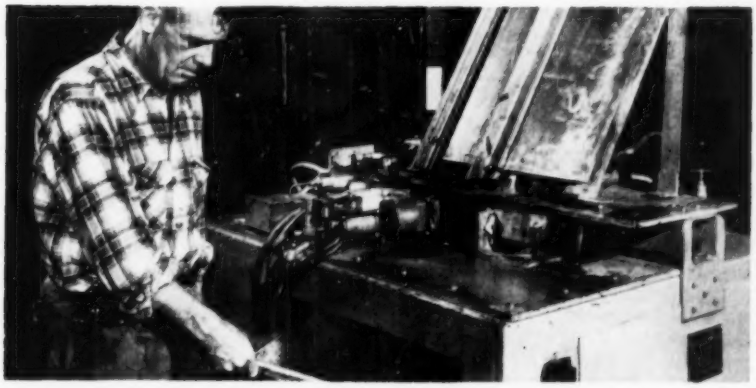
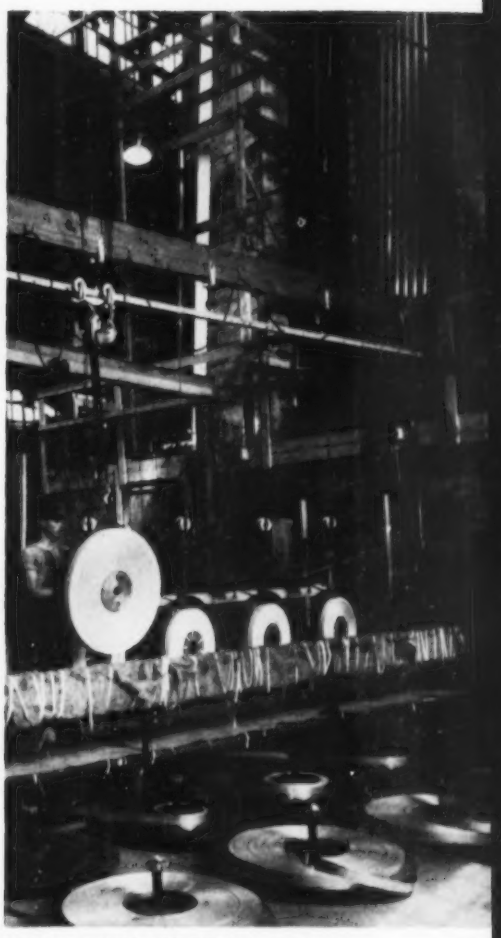
Versatile Power: 5 Examples



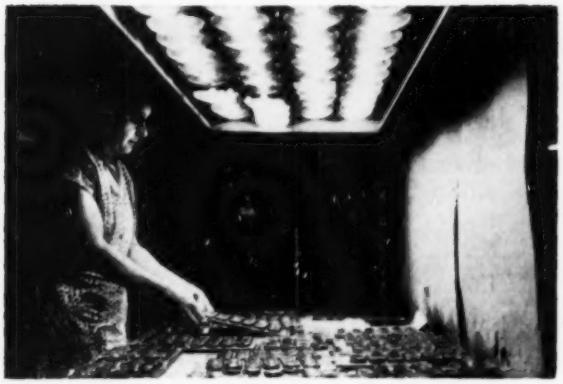
INDUCTION ELECTRIC HEATING is used by new Revere Copper & Brass mill in Los Angeles to make brass the all-electric way. Four induction furnaces like this one do excellent melting job. Advantages include: good metallurgical control, operating simplicity, better working conditions.



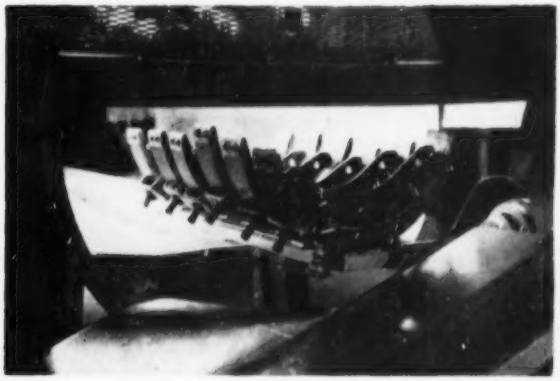
RESISTANCE ELECTRIC HEATING has proved far superior to gas-fired furnaces in heating bolt-head blanks at Southern Bolt & Screw Co. Resistance heater above has: (1) cut labor costs 50%, (2) produced less scale, (3) made dies last longer, (4) improved working conditions.



USING NEW PROCESS and new enamel, this electric bake oven at United Steel Products cuts aluminum and steel strip-finishing costs.



USE OF INFRARED LAMPS for curing plastic is illustrated by this scene from Handicrafters Mfg. Co.'s Oakland plant. Hooded bank of 48 250-w. reflector-type lamps takes only 5 min. to cure plastic cuff links, pins, brooches.



NEW 11-KW. INFRARED OVEN (above) boosts output of relined automobile brake shoes fourfold at Mendenhall Auto Parts Co., Salt Lake City. It has 22 550-w. lamps, bonds lining and shoe in 15 min.—Elec West, Apr, p86

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Six Practical Methods for Converting Sea Water

(Cost: 1,000 gal., in 75-million gal. per day plant)

VAPOR COMPRESSION
$1.25–$1.50—using presently developed equipment.
60–70¢—based on equipment now in laboratory.

ELECTRIC MEMBRANE
Cost depends on salt content.
$1.25–$1.50 for sea water.
12½¢ for 10,000-ppm. brackish water.
1¼¢—for 885-ppm. brackish water.
All figures estimated from laboratory-scale equipment.

SOLAR EVAPORATION
$2 or slightly less.
Some chance to reduce equipment costs—best chance on long run, when the cost of other energy types increases.

HIGH TEMPERATURE, PRESSURE
30–80¢—estimate of company, assuming no great problems in scaling up from small laboratory apparatus.

THERMAL DIFFERENTIAL
70–80¢—at special locations where waters have 16°F. difference in temperature (based on small-scale unit).

MULTIPLE EFFECT EVAPORATION
$1.50–$2.00—operator's estimate (based on 1-million gal. per day).
$3.00—other estimate.

Desalts Sea Water

For full development, many areas in the world need fresh water. Studies show six processes may be practical for converting sea water

FOR THE PAST 2 YEARS, the U.S. Department of Interior has had salt-water conversion problems under study. It now feels that fresh water for industrial use can be produced from sea water at costs competitive with what some companies now pay to develop fresh-water sources. If fresh water can be provided at a cost of 40¢ per 1,000 gal., it believes the process could be used by some municipalities. One of the processes investigated—the membrane process—could prove an answer to some irrigation water needs.

The six processes that now look most promising (see box) are all in various experimental and demonstration stages. So Interior Department officials hedge their cost estimates. But they believe that progress has been made.

• **Vapor compression** distillation is clearly ahead for sea-water treatment. The Badger Mfg. Co., Cambridge, Mass., has a radically new type of compression-distillation equipment. It involves creating a turbulence in water at the boiling point, producing steam without as much energy as is normally required. This device, still in the laboratory, could easily halve costs, perhaps could go to a 30 to 40¢ figure.

• **Electric membrane process** (McG-H Digest, June '52, p48) has been contracted to its developer, Ionics, Inc., Cambridge, for field tests, probably in Arizona and South Dakota. The brackish waters to be checked contain 4,625 and 885 parts per million of minerals.

• **On solar evaporation,** Bjorksten Research Laboratories, Madison, Wis., is looking into plastic apparatus. Because there are no fuel costs, providing cheap equipment is the only way to cut overall costs. Officials feel this process may become competitive only after costs of other energy sources rise.

• **Temperatures near 700° F.** and pressures of 3,200 lb. per sq. in. would be used in a proposal by Nuclear Development Associates, White Plains, N. Y. At such temperatures, pure water cannot exist; there is no distinction between plain water and steam. But salt water can exist and can be distilled into fresh water with greater efficiency in this high range.

Scaling up NDA's work might bring problems, first in design to use these temperatures and pressures, and second in corrosion at such heats. Titanium has been suggested for use here. Whether the company's 30 to 80¢ estimate can prove out depends on solving these problems.

• **Thermal differential** method's economics depend on having one source of salt water that is hotter than another. The hotter one is evaporated under vacuum, with water vapor condensed by the cooler liquid. The French are building such a plant at Abidjan on the coast of French-West Africa (McG-H Digest, June '53, p22).

• **Multiple-effect evaporation,** a continuous process for evaporating more and more water, is used in such locations as Kuwait, in the Middle East. But costs are high. —Eng News-Rec, May 6, p25

Ductile-Iron Repair

Ductile-iron castings with blowholes and slag inclusions can be salvaged by a technique developed by North American Aviation, Inc. Imperfections are drilled out. Then the casting is preheated to 500 to 600°F. in a furnace, removed, and kept hot in weld zones.

Cavities and surrounding areas are primed with cast-iron welding flux. Cavities are then filled by inert-gas welding with argon shielding gas and a carbon electrode. Metal is supplied from a fluxed ductile-iron welding rod. Generous amounts of flux allow slag to form on top of the weld and prevent cracking of the weld.—Weld Eng, May, p49

PRODUCTION IDEAS

from Manufacturers' Catalogs

Cellulose Acetate—Booklet describes the properties and uses of cellulose acetate. New data on solvents, plasticizers, and resins are included.—Hercules Powder Co., Wilmington, Del.

Building Material—Catalog FLX-15A contains complete information on a noncombustible asbestos-cement building board. There are sections showing how Flexboard can be used in industrial, agricultural and residential fields.—Johns-Manville, 22 East 40th Street, New York 16, N. Y.

Cut-off Wheels—A completely revised booklet, "Norton Cut-off Wheels," gives information on various types of cutting-off machines and abrasive cut-off wheels, their selection, application, and usage.—Norton Behr-Manning Overseas, Inc.,—Worcester 6, Mass.

Pneumatic Weighing Scale—Catalog 10 describes new platform weighing scale adaptable for batch or continuous process control. Capacities, dimensions, and typical applications are given.—Weighing Components Inc., 64 Fulmor Road, Hatboro, Pa.

Time Switches—The complete line of time switches, process timers, and time meters is described and illustrated in bulletin GEA-5965. Features, specifications, operating data, and pricing information are included.—International General Electric Co., 570 Lexington Ave., New York 22, N. Y.

Valves—Directional and functional valves ranging from 2,000 to 3,000 lb. per sq. in. are described and illustrated in catalogs 801, 821, and 841.—The Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.

Emergency Closing Device—A portable "Pneu-Draulic" safe emergency closing device for use with standard magnetic circuit breakers in metal-clad switchgear is described in bulletin 71B8105.—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Foundry Equipment—The complete line of equipment for mechanization of ferrous and nonferrous foundries and use in increasing production and producing better castings is covered in book 2423.—Link-Belt Co., 233 Broadway, New York 7, N. Y.

Industrial Micarta Plastic—Catalog B-5878 covers all grades and forms in which Micarta is supplied and the chemical, mechanical and electrical properties of each.—Westinghouse Electric International Corp., 40 Wall St., New York, N. Y.

Freon Compressors—Bulletin No. C-1100-B30C describes Freon compressors for all applications in air conditioning and refrigeration, and includes detailed cut-away drawings to show the internal parts.—Worthington Corp., Harrison, N. J.

Triple-Zone Insulation—Tips on the installation of GILSULATE, the new triple-zone insulation for hot underground pipes, are given in an illustrated booklet.—American Gilsonite Co., 1145 East Jersey St., Elizabeth 4, N. J.

Elevator Belting—New engineering handbook describes and illustrates types of belt bucket elevators, gives factors for belt selection, outlines procedures for engineering the correct belt, and describes belt construction features.—B. F. Goodrich Co., Akron, Ohio.

Sand Screen—Folder A-1248 describes Sand Screen, a new nonclogging open-mesh abrasive material, designed especially for sanding operations where loading or glazing is a problem.—Carborundum Co., Niagara Falls, N. Y.

Machining Characteristics—Booklet, "The Machining Characteristics of Leaded Steel and Free-Cutting Brass," contains charts and diagrams showing brass and leaded-steel machinability as measured by wear on cutting and drilling tools.—Titan Mfg. Co., Bellefonte, Pa.

Die Casting Machines—Bulletin 23.2 describes in detail complete line of die casters. Capacity and pressure tables are important additions to new catalog.—Lake Erie Engineering Corp., 600 Woodward Ave., Buffalo 17, N. Y.

Water Conditioning—Booklet No. 3497 describes the multiple benefits of soft water in the home and outlines advantages of the Electro-Matic home water softener.—Permutit Co., 330 West 42nd Street, New York 36, N. Y.

Electric Radiant Heaters—High speed drying and curing of synthetic-textile finishes by means of far-infrared radiation is covered in an illustrated folder entitled, "The Textile Report."—Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa.

Gravity Conveyors—Illustrated catalog and field report gives complete information on gravity conveyors.—Rapids-Standard Co., Inc., 310 Rapistan Bldg., Grand Rapids 2, Mich.

Hardfacing with Stellite—Have you got equipment with vital parts wearing from abrasion, corrosion, or heat? Booklet, "Hardfacing with Deloro Stellite," tells how to keep the equipment running up to ten times longer.—Deloro Smelting Co. Ltd., Deloro, Ontario, Canada.

Versatile Vehicle—Booklet, available in both English and Spanish, contains complete information on the Willys Jeep. Details on special equipment are also included.—Willys-Overland Export Corp., Toledo 1, Ohio.

Heavy-duty Lathe—Folder contains complete information on the Martin heavy-duty high-speed lathe, Type DL 500. Details of standard equipment and special accessories are included.—K. Martin, Machine Tool Works, Offenburg/Baden, Germany.

Negative Files—Booklet titled "Filing Negatives and Transparencies" contains typical examples of negative files for both small commercial or industrial photographic operations. File retention programs and file operations are also described.—Eastman Kodak Co., Rochester 4, N. Y.

Dry-type Transformers—Catalog No. 353 describes and illustrates a complete new line of Dry-Type transformers. Complete specifications are given.—Hindle Transformer Co., Inc., Woods Church Road, Flemington, N. J.

Silicone Rubber—Bulletin AD-147 describes the heat-resistant and aging-resistant features of silicone rubber and gives examples of typical applications. Some silicone rubber products described are diaphragms, gaskets, oil seals, and insulation tape.—Garlock Packing Co., Palmyra, N. Y.

Automatic Instrumentation—Bulletin 14-1 describes the way Electronik instruments can help the research man. Descriptions of various servo-components and accessories are included.—Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave., S., Minneapolis 8, Minn.

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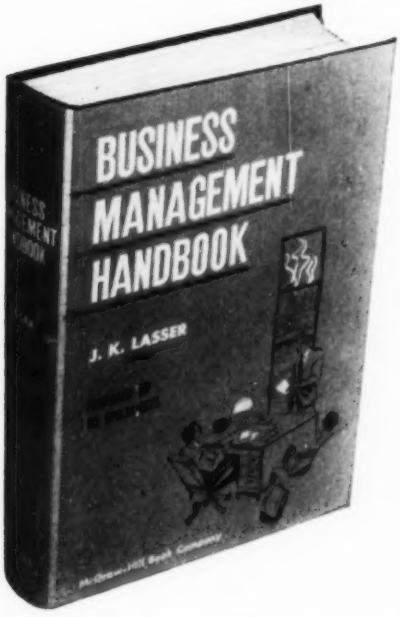

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Here's Another Magazine We Digest

Its Field: World Mining

ENGINEERING AND MINING JOURNAL, founded in 1866, is the oldest McGraw-Hill magazine, and is among the broadest in the range of technical activities it covers. E&MJ deals with exploration for mineral deposits other than coal and petroleum, and with the mining, milling, smelting, and refining of metals and nonmetallic minerals.

In addition, E&MJ covers the news of the metal mining industry, as well as its economics and politics. Through E&MJ Metal and Mineral Markets, weekly market information is published. Its price quotations serve as the specific settlement basis for metal sales contracts all over the world.

Thus E&MJ's editors have to cover things as widely separated as a new uranium "strike" in Canada's Northwest Territories and hearings on a mine subsidy bill before a Congressional committee. Their interests may include an inter-union battle in Butte, Mont., as well as a new cobalt-nickel refining process in Alberta.

All this takes a lot of planning to preserve balance in E&MJ's editorial content, and a lot of travel by the staff to cover the world-wide field of the mining industry. In the past year, E&MJ's editors have visited mines as far south as southern Chile and as far north as northern Manitoba. They have covered in their travels the North American continent from coast to coast this last year, not once but several times. Future trips will take E&MJ staff members to Europe, Africa, and Australia.

Robert H. Ramsey
Editor, Engineering and Mining Journal
Editorial Director, E&MJ Metal
and Mineral Markets

In addition to its present full-time staff of 9 editors, E&MJ is served by 18 special E&MJ correspondents in mining districts around the world.

Drawing on all this talent, E&MJ is determined that its age shall be a tradition to be proud of, not an encouragement to traditional thinking in its editorial job. The metal-mining industry is growing fast, and E&MJ has to be fast to stay ahead of it.

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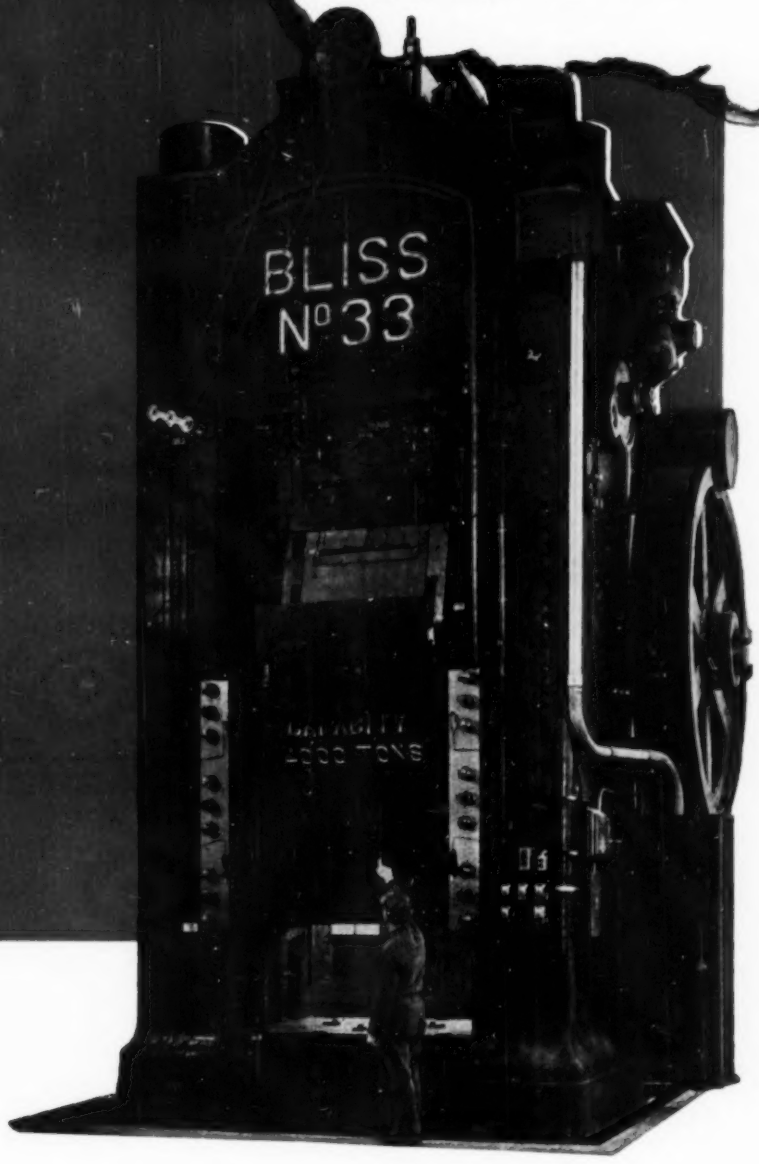

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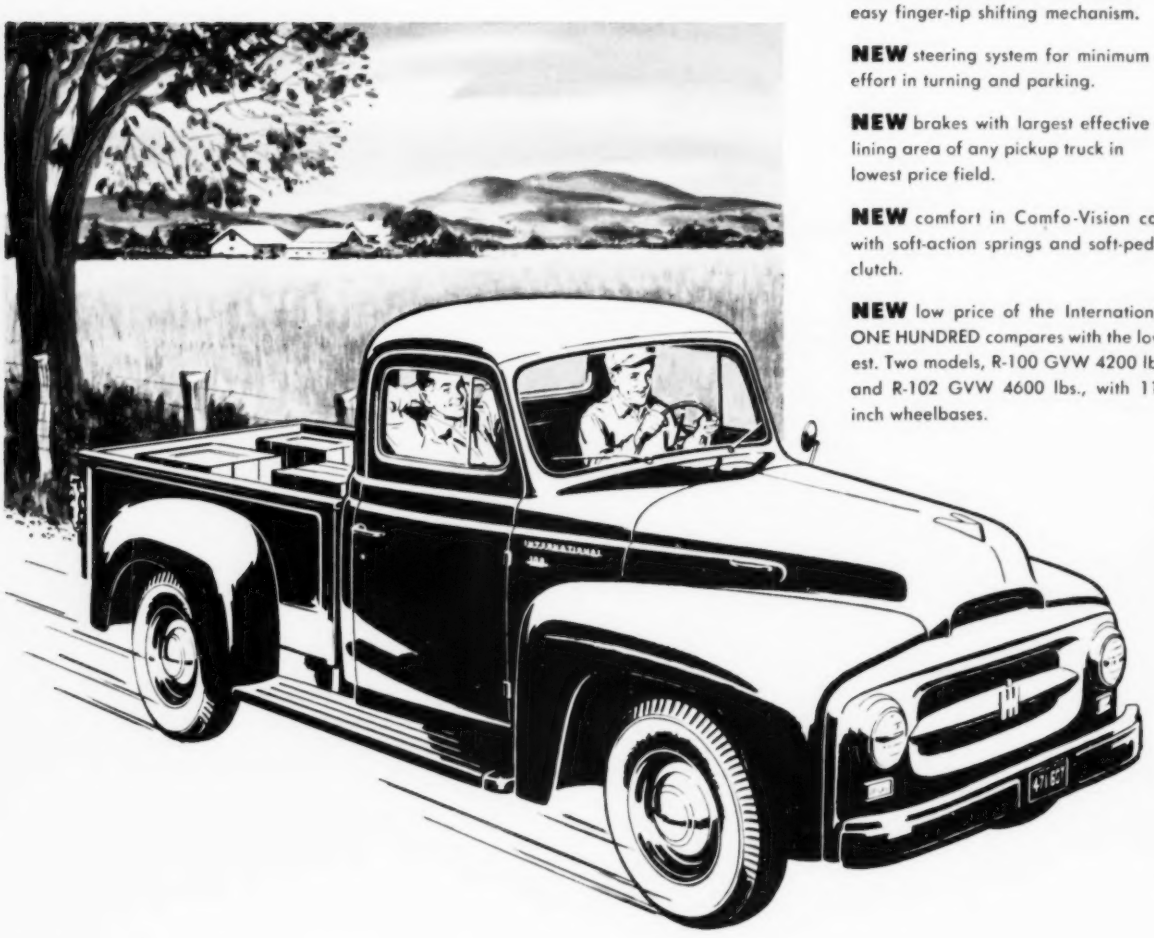

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